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LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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EDITORIAL NOTES.

Operations on the Industry's Borders.

In considering its own future manufacturing policy, the gas industry will be well-advised to maintain close observation upon developments that are now proceeding in kindred fields. We know there are very substantial companies *in embryo* or actually formed that are contemplating the construction of carbonizing plants on this or that system, from which products will emanate which will compete more or less with, or go to swell the supply of, certain of the products derived from coal carbonization at gas-works. These are matters that must not be overlooked in shaping the policy of the gas industry. Of course, no one can yet say whether the experimental work on which the new processes are based, together with the estimates which are alluring in respect of profit upon the capital involved, will result in good commercial propositions, nor can anyone say that there will not be good commercial success. The gas industry has to regard these developments in the light of possibilities. One point in favour of the new carbonizing processes that is highly attractive is the position of motor spirit; but in this respect they, too, will be subject to developments. It is an accepted fact that the use of mechanical propulsion on the world's roads (and what it is going to be in the trackless ways above no one can say) is outstripping the supply of petrol; and America is looking a bit anxious over her own oil position in view of the growth of demand. She is also rather concerned over the extension of British interests in the other oil-fields of the world. Upon this comes the manifest intention of our Government to encourage all sources of production of motor spirit at home. No one can object to this. It is—the late war and submarine activities have convinced the country—a matter that is vital to self-protection. Hence the prospectuses announcing new companies which are professedly intending to direct their energies to oil and motor spirit production as being for them the chief of the line of derivatives from coal.

We have not hitherto specifically referred with any prominence to these new ventures; but among them are promotions directed to making use of inferior coal and colliery waste. One prospectus of a company having this as its objective was published early last week. It is that of the Carboil Syndicate; and it is particularly interesting for certain reasons. In the first place, this is a company that has renounced low-temperature carbonization as the beginning and end of what carbonization should be. We have seen other owners of low-temperature systems coupling-up to them producers for converting their coke into gas, and recovering the ammonia. The Carboil Syndicate have come to the conclusion that low-temperature carbonization standing by itself is not satisfactory, and so have adopted what to all intents and purposes is a two-stage system for (as we have said) dealing with inferior coal and colliery waste. There are other workers in the same field who have not yet submitted their processes to the public for financial support. And our knowledge of the work proceeding permits us to state that the Carboil plant is not the only pebble on this beach. It may, for all we know at present, be the very best in this particular class; and equally it may not prove to be so. It is too early yet to make comparisons; but, if the various schemes mature, there are rivals on the way. Another point is that when one talks of dealing with inferior coal, the standard of quantitative requirement in plant has to undergo some revision. And where there is a two-stage system, working at a low temperature in the initial part and at a higher temperature in the second part, we can well imagine the rate of working will be slower in the earlier stage than in the latter. Perhaps this is a matter that has been dealt with, and the speeds of working have by some arrangement of operation been synchronized. Anyway, dealing with inferior coal or colliery waste must mean the provision of more plant, material handling, labour, and capital and working expenditure than for an equal output with better-class coals. *Per contra*, the inferior coals and the colliery waste will, of course, be purchasable at a lower rate than high-class coal.

Another excellent reason for the Company, after long experimental work, discarding low-temperature carbonization as the beginning and end of what they propose, is that they found the development of the industry as an oil-producing one was hampered by the fact that oil and sulphate of ammonia were really the bye-products, and a semi-coke the primary product, and that the conditions are not always expedient for a ready market for semi-coke. This is readily understood. A semi-coke must in the very nature of things be sold at a high price. It must be made from high-class coal, which coal owners can deal with profitably in many other ways. The demand for semi-coke—it being essentially a household commodity—would vary enormously as between winter and summer; and, being very friable, it would by storage while awaiting sale depreciate enormously, and be unsaleable at a good price. Thus the limitations and disadvantages of a process having as its primary product a semi-coke for domestic purposes are considerable. So it comes about that the Company in question, as others are doing, have abandoned the system of low-temperature carbonization *per se*, and have developed a two-stage system for inferior and waste coal, in which system the oil and motor spirit are the primary products, and sulphate of ammonia and gas for power and other industrial purposes are the subsequent ones. It is believed that the plant will have a wide adoption among collieries, and will have an expanding and lucrative career. The Technical Adviser to the new Company is Mr. W. J. A. Butterfield. He has reported favourably upon the combination process and its objects; and he regards the estimates as to profits as being quite on the conservative side.

We have not referred to the Carboil system for any purpose other than as an illustration of development among other processes on the borders of the gas industry, and because all carbonizing systems whatever their principal aims will in some degree or in some place affect the gas industry's business or reduce its potential scope. If, however, aims and objects are justified in the result by new and useful service being rendered, even an old-established industry cannot complain. But oils and motor spirit are the primary objects of these later developments; and whatever degree of success they may achieve will only be maintained so long as there are not other developments which will reduce their field of operation. It may be that it will be some time before alcohol will be available in quantity sufficient for producing suitable motor spirit by admixture with benzol or ether. But there are workers in this direction; reports received by the Government have advocated attention to alcohol production for power purposes; and the Board of Fuel Research are investigating it. It would be an (at present) incalculable time before coal carbonization could produce sufficient benzol to make the country independent of petrol importation; and if the 35 million tons of coal used annually for domestic heating were all displaced and treated by the low-temperature processes for the production of a semi-coke in order to obtain motor spirit, it would mean that still greater inroads would have to be made on our coal re-

sources; for to obtain from the semi-coke the same amount of heat for domestic purposes as from the 35 million tons of coal, another 10 to 15 million tons of coal would have to be treated. This, of course, is never likely to happen the low-temperature way, because the gas industry has other designs for domestic heating, and public inclination in the matter is being largely turned to the adoption of a labour-saving heating agent. Benzol, however, will always have a market as a motor spirit. The extent of the market will depend upon various conditions, in which alcohol may have some part. Whether it will or not is a question yet to be answered. While benzol is quite interchangeable with petrol, alcohol is not. To use it alone much higher compressions would be required than are at present used with engines employing benzol or petrol, in order to obtain the same power. A mixture of equal parts of alcohol and benzol will supply a usable motor fuel; but investigators are rather favouring for the mixture the cognate and more volatile ether. However, these are matters for investigation, as well as is the source of the alcohol—that is, as to whether it will be preferable to obtain ethylene for the production of alcohol from gas-works and coke-oven plants, or to manufacture from alcohol-yielding vegetables.

There is a point in these carbonizing developments, in which our electrical friends will be specially interested, or those of them who have been talking at large of putting-down super-stations as near as possible to collieries, and to collect from them waste heat, use the inferior coals, and supply the collieries with electrical energy. The two-stage carbonization systems could (assuming they are technically and commercially sound) be worked in conjunction with coke-oven plants, or be installed at collieries quite as a separate development, and the gas be used for supplying light, heat, and power over the collieries and the auxiliary carbonizing plants. If this were done, electrical people who have planned developments in connection with collieries would find they have been entertaining another chimera.

Piecemeal Financial Revision in the House.

The Tramways (Temporary Increase of Charges) Act, which is, for the one form of enterprise, to amend the Statutory Undertakings Act of 1918 had, after debate, a second reading in the House yesterday week, and was then referred to a Standing Committee. Information concerning the Bill was given in the "Journal" for April 6. The debate disclosed that the House generally is in favour of doing the right thing; but there were two or three members who, perhaps unconsciously, went out of their way to be about as illogical as it was possible for them to be. In the first place, it appears that, in the case of tramway undertakings, the fresh revision is only to be temporary. The word "Temporary" appears in the title of the Bill; and, according to Sir Eric Geddes, the revision carried out under the powers of the Bill when it becomes an Act is only to last during its duration—that is to say, until Feb. 15, 1923. This is an important point; and the interest of the gas industry in the matter and in precedents is, of course, due to the nebulous condition in which it stands at the moment in relation to the question of the revision of its own financial conditions. There were two statements made during the debate—one was by Sir Eric Geddes, and the other by Mr. Neal, the Parliamentary Secretary to the Ministry of Transport—which seem to be utterly irreconcilable. Sir Eric says that any question of permanently increasing the charging powers of the undertakings is, he thinks, negatived by the fact that whatever power the House chooses to give will lapse in February, 1923. "It is a temporary "provision; and, simply in order to fix a date, we take the "same time that the similar provision lapses for railway "charges. That was fixed at a time in order to enable "the railways to promote, if they wished, Private Bills to "increase their charging powers; and then will be the time "for the House, in dealing with these Private Bills, to "exercise the control which it ought to exercise, and to "revise the bargain in a fair way." On the other hand, Mr. Neal, introducing the Bill for second reading, avowed that he did not think anybody would deny that, in the case of 263 undertakings, many of which require this relief, it would be nothing but a gross scandal and a waste of public time and money if each of them was required to promote a Private Bill.

Mr. Neal is right. But Sir Eric is under the impression that a course of action will have to be taken three years hence, in connection with the Tramways Bill, which Mr. Neal is of opinion would be a gross scandal and waste of public time. It seems to us the sane method is—at any rate in the case of the gas industry—to deal with the matter once and for all. The machinery that is being set up—the appointment of an Advisory Committee to institute inquiries and examine the position of the applying concerns—is of a judicial character that could save a great deal of anything that could be stigmatized as a "gross scandal and a waste "of public time," such as will be caused by the undertakings having to come to Parliament before 1923, each with a Private Bill, to save themselves from receding to the present deplorable financial state. This is not the sort of revision that the gas industry is hoping for. For Parliament to deal in this piecemeal fashion with a matter which is vital to statutory industries will simply keep holders of capital and investors in a condition of crippling uncertainty; and there will be the work of investigation, argument, and determination to be done all over again. It is to be hoped that in the case of the gas industry the Board of Trade will take a strong course, and deal with the matter of financial revision on a permanent basis. There is a further reason in favour of this, which is that the industry is being put on a heat-unit basis of charging. Its whole operations are being overhauled; and a single clean job should be made of it.

The speech of Mr. Neal, in moving the second reading of the Bill, was based largely on justice; but we should have liked to have heard more as to expediency. For it is exceedingly bad policy for the Government to allow to continue the sadly weakened financial stability of statutory undertakings, and to present to investors a state of insecurity. Such circumstances cannot be the best possible for promoting development. There is propriety in the resolve not to allow municipal undertakings to increase their tramway charges higher than is necessary to make a profit equal to their obligations, but exclusive of any contribution to the rates. As to tramway companies, revision is to be permitted to an extent that will allow a "reasonable return" upon the capital; and in this connection, in drafting the Bill, the exact words have been taken that were embodied in a resolution passed by the House when dealing with the London Underground Railways. A "reasonable return" is all that is required. But what will be regarded as a "reasonable "return"? We repeat what has been said before. The Government are paying 5¾ p.ct. with all the resources and security of the State at their back; the London County Council are offering a 5¾ p.ct. loan at 95; municipalities are inviting loans at 6 p.ct., and the issues are made at under par (98 p.ct.) and redeemable at par—practically a difference of ½ p.ct. Even on these terms underwriters have had considerable parcels of municipal stock left on their hands, and other local authority loans have been undersubscribed. The Advisory Committee to be set up under the Tramways Act will have a difficult task in determining the question of a "reasonable return" to companies, "regard being had "to the pre-war financial condition of the company, and its "prospective development."

What is proposed for the Tramway Companies was described by Mr. Neal as a "bare act of justice." But justice to capital invested in any statutory undertaking does not appeal to Colonel Wedgwood, who made in opposition one of the most unreasonable and short-sighted speeches in the debate. But his amendment, that the Bill be read that day three months, did not secure many supporters. If his views were the paramount ones, then it would simply mean the wrecking of every enterprise carried on under statutory authorization. It would mean, too, that investors, not being able to count on the protection of Parliament when old conditions are extinguished and new ones created, would decline to support statutorily regulated enterprise. A fresh airing was given to the old platitude as to a bargain with the State; but because the bargain has turned out unsatisfactorily owing to the war seems to be no concern of Colonel Wedgwood. Bargains are made on certain fundamental conditions. The war has wrecked these conditions absolutely; and new ones have been evolved. Bargains cannot continue to be carried out if the conditions are non-existent upon which they were made; moreover, the change in conditions is not the product of statutory undertakings, but of something of national—and international—concern. Then Mr. Griffiths evinced his power as a statesman by declaring his willingness to support the Bill so far as it proposes to meet the increased charges for workmen; but he announced his intention of opposing it if it meant giving

extra dividends to the shareholders. This attitude not only shows inconsistency, but it betrays a want of balance in the mind of a man who would legislate for something extra in the pay of labour, while he would refuse (to use again Mr. Neal's expression) "a bare act of justice" to capital. He evidently rejects the existence of the interrelation of capital and labour; and between the two he apparently opines that there should be no such thing as legislative justice. We have something to be thankful for that the legislation proposing to bring about conformation between the new economic circumstances and the terms upon which statutory enterprise is working is not left to men who are actuated by principles so utterly devoid of reason. If it were, there would be no conformation.

No Coal Miners' Strike—this Time.

Reason has triumphed in the ranks of the miners; and so there is to be no strike to enforce the Miners' Federation claim for a flat-rate advance in pay of 3s. per day for all workers over 16 years of age, and 1s. 6d. for those below. On the contrary, the very generous offer of the Government has been (as the Executive of the Federation considered it should be) accepted—viz., 20 p.ct. on the contract rates or gross earnings, with a guaranteed flat-rate minimum of 2s. a day to all workers above 18 years of age, 1s. a day to workers between 16 and 18 years, and 9d. a day to boys under 16 years. The voting is most interesting. For the acceptance of the Government offer, 442,704 votes were cast, and for a strike 377,569—a majority of 65,135 in favour of acceptance of the offer. In fifteen districts, there was a majority in favour of the wise course; and in three districts—South Wales, Lancashire, and the Forest of Dean—majorities for a strike. If the voting had been the affair of the men only, there is confidence that the proportion of those voting in favour of acceptance would have been still larger; but the boys, with less sense of responsibility, and an undue estimate of the value of their services, in comparison with those of the men, seem to have voted heavily in favour of a strike. It will be observed that a total of 820,273 votes resulted. In such a number, a majority of 65,135 is not a great one, and might easily be overturned. But the rules of the Miners' Federation provide for a two-thirds majority before a strike can be called; and two-thirds of 820,273 would be 546,848, of which figure the voting in favour of a strike fell short by 169,279. The victory of reason was therefore a substantial one.

There will be general satisfaction over the result; but how long the settlement will last, no one can say. However, it is to be hoped that the principle of payment by results, which the 20 p.ct. re-establishes in the coal industry, will in future, if the occasion again arises (perhaps the word "when" should be used in place of "if"), be pushed home so that the nation obtains for increased expenditure some return in the way of augmented production. The more immediate question is, who is to pay for this fresh advance—the home consumer or the foreign? The Miners' Federation are of opinion that exported coal will produce ample means for meeting the additional obligation; but their estimates were made before the price of bunkers was reduced, which proceeding will result in the absorption of several million pounds of the anticipated profit. The accountants employed by the Government to investigate the financial position of the coal industry do not encourage the hope that coal export profits will alone permit of this additional heavy wage burden being borne, *plus* the 10s. reduction per ton to the domestic consumers. Someone has to suffer to satisfy the miners. The only alternative to export profits is the increase in the cost of coal to the home consumer. The additional cost, it is calculated, will mean about £35,000,000 a year, or about 4s. per ton on home consumption. We can only hope that the Miners' Federation are right, that the profits will be ample to bear the extra weight of cost. The Government, however, can take no risks; and so we should not be the least surprised to hear of the need for now supplementing revenue from the home consumers. The abolition of the 10s. reduction on domestic coal would not alone meet the new burden.

Having cleared off the slate—temporarily or otherwise—the question of miners' wages and a strike, so making room for that as to where the money is to come from, the next item is as to the railwaymen's demand for £1 increase in wages. The matter has been before the Railway Central Wages Board; and it is to be further considered, if possible, some time this month. Meanwhile, engine drivers, motormen, firemen, and assistant motormen, and adult engine cleaners are to have a 3s. advance, in view of the "increased cost of living." The last settlement was on Aug. 18, when the increased cost of living stood at 115 p.ct. above normal. The 3s. is made up as follows: 1s. per week from Nov. 1 last, when the cost of living stood at 120 p.ct. above normal; 1s. per week (making 2s.) from Dec. 1, when the cost of living stood at 125 p.ct. above normal; and 1s. per week (making 3s.) from March 1, when the cost of living stood at 130 p.ct. above normal. In view of the increase in the cost of bread, the Board are going to review the position again as soon as the Ministry of Labour statistics as to the cost of living on May 1 are available. Truly we are living in restless times.

Small Gas Companies and the Capital Issues Bill.

Gas companies well down the scale of magnitude have been, and are, feeling very acutely the difficulties of raising money for capital purposes. Where larger companies have trouble in raising money on terms that at one time were never dreamed of for debentures and preference stock or shares, the small companies, through being in worse circumstances owing to the war, cannot raise money at all, or must get it (so far as their limitations will permit) just where they can. Such companies are debtors to-day to Sir Henry Cowan, who, when the Public Utility Companies (Capital Issues) Bill was up in the House for third reading yesterday week, succeeded in obtaining an amendment which, if not precisely giving all he asked for on behalf of the gas industry, is a distinct advantage. He put the case for this in a way that elicited the sympathy not only of Mr. Bridgeman, the Parliamentary Secretary of the Board of Trade, but of the House itself. The Bill, as amended by the Standing Committee, was published in the "Journal" for March 23 [p. 702]. As the text originally stood, it was intended to apply to gas and water companies only; but it has been extended to embrace hydraulic power, electricity, and tramway undertakings. Then the House agreed to substitute for "offer for sale to the public" any such stock, the words "offer for subscription by the public." Thus the necessity of issuing stock by auction or tender is removed so long as the Bill, when it gains the status of an Act, remains in force. But the words "for subscription by the public" have been inserted to ensure that a company shall not make arrangements with their friends behind the backs of the public for taking-up shares at an advantageous price. It has also been agreed that stock may be issued at a fixed price lower than the normal amount of the stock offered; and all allotments of the stock are to be made as nearly as possible *pro ratâ*.

These amendments would, in the case of the small companies, have nullified the benefits the measure will confer, inasmuch as the small companies have no open market for their shares. Such companies are usually financed locally; but the local investor, without a dividend or the shadow of one only, will not be desirous of dipping deeper into his pocket to finance a concern that has let him down so badly at a time when income wants to be increased and not diminished. The small companies will consequently have to rely on obtaining money from insurance, finance, or trust companies; but the Capital Issues Bill as it stands would have prevented such companies getting money where they could, and on the most favourable terms. Hence it was that Sir Henry Cowan moved an amendment providing for the appropriate Department dispensing with the prescribed conditions in the case of any gas undertaking in which it is proved to the satisfaction of the Department that the issuing under these conditions of the capital required would prejudice the raising of the capital, or the obtaining of the best price. It will be seen that this amendment would have applied to any gas company who could have satisfied the Department that the undertaking would reap advantage by securing money outside the imposed conditions. But Mr. Bridgeman apparently objected to the open door for all gas undertakings for any amount of capital; and so he suggested words (which were accepted by the House) to put a limit to the sum that may be raised outside the terms of the measure. The effect of the amendment is that the terms may be dispensed with, provided that the sum to be raised does not exceed £20,000, and that it is proved to the satisfaction of the appropriate Department that the observance of the limitations would prejudice the success of the

issue, or the realization of the best price. This is an improvement that was required in the public interest, and to enable the smaller gas undertakings to do their duty to the public. Without this extension of power, the advantages of the enabling measure would have been very much confined to the larger undertakings.

Standard Test for Spent Oxide.

There has been a considerable amount of trouble in the past between buyers and sellers of spent oxide owing to the divergence of test results as to sulphur content. Now that the price of the sulphur unit has advanced, it is more than ever necessary that there should be the greatest possible accuracy both in sampling and testing; and not only so, but the methods should be on a uniform basis. There has not been this uniformity in the past, as was shown by the extended review of the methods in use which was made in our columns in January of last year by Dr. Harold G. Colman, and Mr. E. W. Yeoman, B.Sc. Now standard prescriptions (published in a later column) for both sampling and testing spent oxide have been prepared; and the National Gas Council have approved of them, and have sanctioned publication. The firms who have been interested in the preparation are (we learn from the Manchester Oxide Company, Ltd.) Messrs. Spenser Chapman and Messel, the Gas Purification Company, Messrs. Hardman and Holden, Ltd., the West Cumberland Bye-Products Company, and the Standard Products Chemical Company, of Glasgow. Dr. Colman has been consulted. There is no doubt that much of the disagreement of the past has been due to defective sampling, and insufficient care in the preservation of the samples. The sampling prescription is an imperative necessity if reliable and concordant results are to be obtained. A rule is given for the preliminary treatment of the oxide before making the analysis. Then follow the methods to ascertain first the moisture; secondly, the percentage of sulphur, *plus* the extracted tarry matter; and, thirdly, the percentage of sulphur free from tarry matter in the oxide as originally taken. One point in regard to moisture. It will be seen that the analysis prescribes three hours' drying. Dr. Colman suggested that one-and-a-half hours would be preferable. The alteration was made; but the National Gas Council were in favour of the restoration of the three hours. So the three hours stand. However, if there is universal adoption of the standard methods, there should be better agreement between buyers and sellers, much of the time should be saved that has hitherto been wasted in trying to get-out figures acceptable to both parties, friction will be avoided, and thus business will be facilitated.

Coke Firing.

Coke—the one-time much-despised fuel—is gaining for itself quite a new character. It was not so much its fault that it got a bad name before, as that people did not know how to use it; and the appliances were not suited to its use. The London Coke Sales Committee, and their energetic Engineer and Fuel Expert (Mr. E. W. L. Nicol) are largely responsible in this particular for dethroning ignorance and putting knowledge into its place. Mr. Nicol last Tuesday told the Smoke Abatement Committee something as to the success that was attending the uses of coke. We have seen, through the use of coke in connection with steam-boilers, efficiency raised and economy promoted; and the favourite way of achievement—at any rate, among electrical engineers—is to improve the physical characteristics of the fuel-bed by sandwiching coal and coke. Mr. Nicol pointed out that if one uses equal quantities of coke and coal, the smoke trouble is reduced enormously. If one cannot get the whole way in the prevention of a recognized evil, it is better to get a large part of the way. The use of 50 p.ct. each of coal and coke has an effect greater than a 50 p.ct. reduction of the smoke trouble; for the coke, besides being non-smoke-producing, promotes better combustion conditions. The same applies to the domestic fire grate; and Mr. Nicol, while he thinks that our final destination will be a gaseous fuel, looks at the matter from a practical point of view, and suggests that good initial work in the elimination of smoke might be done by prohibiting in new dwellings the installation of solid-fuel appliances limited to the use of crude coal. A great deal, too, might be done in existing dwellings, when more coke is available for the purpose, by compelling the use of mixtures of the two fuels. The users would gain in the improved combustion, and the greater uniformity of the radiant heat evolved.

Water Heating by Coke.

Our electrical friends who claim that—given the necessary time—they can heat water more cheaply, even in present circumstances, than can any other agency (there are not many such foolish electrical men) will probably be interested in reading Mr. Nicol's statement as to water heating by coke-boilers, and making comparisons with their own performances as to the quantity of water that can be supplied for a moderate expenditure. The smallest size of coke-heated water-boiler is sufficient for the hot-water requirements of a family of five or six persons. One hour after lighting the fire, sufficient hot water can be drawn off for a 20-gallon bath at a temperature of 100° Fahr., and then baths can be taken at half-hour—not twenty-four hour—intervals. For a twelve-hour use, the consumption of coke would not exceed in this boiler 28 lbs., which at the modern price of 50s. per ton would cost 7½d. The boiler, too, can be used to operate a radiator. The coke consumed—28 lbs.—has a potential heating value of about 364,000 B.Th.U. At 2d. per unit, 7½d. would buy 3¾ units of electricity, which would give the consumer a potential heating value of 12,825 B.Th.U.!

Synthetic Ammonia.

It was on April 25, 1918, that Mr. Winston Churchill announced in the House of Commons that the Ministry of Munitions—this on the initiative of the Explosives Department—were embarking on the fixation of atmospheric nitrogen on a very considerable scale. He was referring to the immense factory which has been partially constructed at Billingham-on-Tees for the production of ammonium nitrate by the conjoint use of the synthesis and the oxidation of ammonia. The factory is one of the many ventures undertaken during the war for war purposes, but never completed in time to be of any service; and the work of construction was suspended when the armistice came. It has been one of the wishes of the Nitrogen Products Committee that, through some enterprise, the work should be resumed, and producing operations commenced as early as possible. There are various tales going round regarding the plant. It is stated that, though only half-finished, the plant installed is estimated to have cost a million pounds. The name of Messrs. Brunner, Mond, & Co. is mentioned in the newspapers as being the likely purchasers of the factory.

Larger Industrial Profits, and the Exceptions.

There is in each week's issue a table published by the "Economist" summarizing by groups the profit and loss accounts issued by certain classes of companies [those excluded being railway, mining, insurance, and banking companies], and giving the previous year's figures for comparison. These figures are combined at the end of each quarter; and last Saturday our contemporary gave the three-months' analysis of the profits of industrial concerns and their distribution. This shows that net profits disclosed during last quarter were very much larger than in the corresponding period of the previous year—no doubt partly due to the reduction in the rate of excess profits duty. In the period named, 500 profit and loss accounts were analyzed; the aggregate net profits shown, after payment of debenture interest, &c., being close upon £44,000,000, as compared with something over £34,500,000 disclosed in the corresponding period of 1919—an increase of 26·9 p.ct. It is seen by a comparison of the profits of individual groups that in only three cases was a decline recorded during the past quarter. Nitrate companies exhibited a substantial drop in profits; while, it is remarked, "the other two declines—viz., in gas and water companies—is not surprising in view of the fixed nature of their income in face of increasing expenses." Glancing at the table, it is noticed that the number of gas companies' accounts published during the quarter which were analyzed was 31; the profits being £1,489,054, compared with £1,286,026 a year ago—a decrease of £203,028, or 13·6 p.ct. In the matter of reserve appropriation, hotel and restaurant companies stand out conspicuously; whereas "at the other end of the scale, both gas and nitrate companies had to draw upon the balance in hand to pay dividends." In the rate of interest on debenture capital, the gas companies are the lowest in the list—with 3·4 p.ct., against an average of 4·25 p.ct. In the

case of dividend on preference capital, on the other hand, they are at the top of the list, with 6·5 p.ct.; the average being 5·1 p.ct. Coming to the rate of dividend on ordinary capital, this is given as 4·9 p.ct. in the accounts of gas companies analyzed during the past quarter, as compared with 3·1 p.ct. a year ago. The average ordinary capital return over the whole list of different companies was 11·2 p.ct. last quarter, and 9·1 p.ct. for the first quarter of 1919. Taking the return on ordinary capital last quarter, the only class of undertakings shown to be lower than gas are canals, docks, &c., with 2·4 p.ct.

PERSONAL.

Mr. HERBERT DUXBURY, of South Shields, nephew of Councillor Thomas Duxbury, of Darwen, has been appointed Gas Engineer and Manager to the Llandudno Urban District Council. He was educated at the Windermere Grammar School, and holds several certificates in gas engineering subjects. His apprenticeship was served under his father, who is Engineer and Manager to the Windermere Gas Company. From 1908 to 1914 he was at Oldham, where he gained experience in Glover-West vertical retorts, West's compressed-air stoking machines, carburetted water gas, &c. In the latter year he went with the late Mr. T. H. Duxbury, the Engineer and Manager to the South Shields Gas Company, and for some time has been Works Superintendent at Jarrow, under Mr. Dougald Currie, where he gained further experience in Woodall-Duckham vertical retorts, &c.

Capt. W. J. LIBERTY, of the Public Health Department, Guildhall, who was engaged during the war on submarine operations at a naval base in the North Sea, has received the following gratifying message from the Admiral in Command there: "Vice-Admiral Sir Edward Charlton wishes to express his appreciation and thanks to Capt. Liberty for the excellent work performed by the Hull Naval Exchange during the Admiral's command. During the war, the importance of quick communication was very great; and the good organization at the Hull Naval Exchange contributed largely to the success of the operations against enemy submarines."

OBITUARY.

One who was well known in the old school of gas managers passed away on the 6th inst. in the person of Mr. ROBERT JONES, who was Manager of the Dawley (Salop) Gas-Works for about twenty-five years. He retired from Dawley some years ago; but would be well-remembered by many of the older members of the Midland Association of Gas Managers. The funeral took place on Sunday week at Dawley Bank.

On Sunday evening, at Sheffield, the death occurred suddenly of Prof. L. T. O'SHEA, who for the past quarter-of-a-century had made a special study of the chemistry of fuel, more especially in connection with coke-oven developments and the preparation of fuel for industrial purposes. He also devoted a great deal of attention to the question of safety in coal mines, particularly in respect to the gases evolved and the effect of coal dust and these gases on mine explosions. He was educated at Owens College, Manchester, and went to Sheffield in 1880—being Professor of Applied Chemistry in the University for many years. He was Hon. Secretary of the Institution of Mining Engineers.

OFFICIAL CHANGES AT BOURNEMOUTH.

The Retirement of Lieut.-Col. Woodall.

ON his formal retirement last Tuesday from the position of Engineer and General Manager of the Bournemouth Gas and Water Company, Lieut.-Colonel Harold W. Woodall was the recipient of a silver inkstand, suitably inscribed, accompanied by an illuminated address which had been signed (on behalf of the 600 employees) by Mr. P. G. G. Moon.

In handing over the gifts, Mr. Moon referred to Col. Woodall's achievement in the development of the Company's business. Nearly twenty years ago he found a small gas-works supplying a somewhat restricted area. The possibilities were soon realized; and, in the course of time, came the acquisition of the Poole Gas-Works, the purchasing of the Christchurch gas undertaking, and later of the Wimborne water undertaking. There had also been the erection at Poole of the new works admitted to be one of the finest in the country. Col. Woodall, by enterprise and forethought, had, he said, succeeded in transforming a Company dealing with 300 million cubic feet of gas into one which sold 1300 million feet annually, and a district covering 60 square miles into one that covered 200 square miles.

Mr. W. J. Haynes (the Chairman of the Works Committee), who also signed the address, presented Col. Woodall with a photograph of the Committee; while Mrs. Woodall was the recipient of a table lamp.

Col. Woodall, in response, said that he and his wife had roots in Dorset that would never be torn up; and their hearts would always be with the employees. As far as he knew, he had not an enemy in the works; and his happiest thought was that he had 600 friends there. One of the successes of the Company was that they had ever trusted one another. Mutual respect and trust and "getting together" would alone solve the problem of industrial unrest.

As already announced, Mr. Philip G. G. Moon, who has been with the Company for many years, and who acted as deputy for Col. Woodall during the latter's absence on war service, becomes General Manager.

NATIONAL GAS COUNCIL.

MEETING OF THE CENTRAL EXECUTIVE BOARD.

A MEETING of the Central Executive Board of the National Gas Council was held last Tuesday at 30, Grosvener Gardens, Mr. D. MILNE WATSON in the chair.

The Chairman reported that he understood that the Government Bill for the financial relief of the gas industry would be ready shortly. It was pointed out that the recent Bills before the House of Commons with regard to the Underground Electric Railways and the Tramways provided a precedent for financial relief.

With regard to the Public Utility Companies (Capital Issues) Bill, it was announced that this had passed the report stage, and that a compromise had been effected regarding the issue of capital by small undertakings, as a result of an amendment moved by Sir Henry Cowan, M.P.

The Chairman reported a meeting of the National Sulphuric Acid Association on the 9th inst., with regard to the future price of sulphuric acid. A proposal was also reported from the National Sulphuric Acid Association for the purchase of spent oxide from gas undertakings. A Joint Committee is to be appointed to discuss the whole subject.

The desirability of a common policy being outlined for gas undertakings in connection with the various housing schemes was discussed. The British Commercial Gas Association were asked to report to the Council from time to time the steps they are taking in this matter.

It was decided to recommend those members of the Council who make sulphate of ammonia to join the Sulphate of Ammonia Federation, Ltd., membership of which involved no subscription.

ELECTRICITY SUPPLY MEMORANDA.

THE Government are keeping their promise in regard to the reintroduction of the financial and compulsory powers that—so as to save part of the measure, and get the Electricity Commissioners to work—were eliminated from the Electricity Supply Bill on the eve of the prorogation of Parliament last year; and so we may expect shortly to see Parliament engaged in a somewhat keen discussion over the powers that are now going to be sought, and pressed. It will be remembered that the Bill in complete form, being a Government measure, had a fairly easy passage through the House of Commons; but when it reached the House of Lords, the financial and compulsory powers were subjected to such incisive criticism that the Government saw a danger of not being able to get even part of the scheme to work for some period ahead, unless they took the bold course of cutting-out from the Bill all the controversial parts. This they did. The opposition was based chiefly on the facts: (1) That the Government ought not to become financially involved in an enterprise of this character at any time, and particularly when the fiscal conditions of the country are such as to make our best and most level-headed financiers look somewhat gloomily upon the situation; and (2) that the proposals of the measure were of a character that opened-up more clearly the way to nationalization, and would be detrimental to private enterprise and individual initiative. The House of Lords looked at the matter from very practical points of view, and did not want precedents created in this direction. Hence the trepidation of the Government as to the success of the scheme, which was not only opposed by the Lords, but did not meet with the approval of a large section of the industry mostly concerned. In this matter, the Government are in a curious position; but their expressed intention is to doggedly proceed in the face of hostile opinion of the highest order. Generally speaking, the electricity industry are quite satisfied with the powers conferred by the Act passed last session, and would rather be without the additions that the Government are now proposing to push forward. Confident we are that there will be a strengthened hostility to what is proposed, if (as we believe is the case) the extending Bill is simply composed of the deferred clauses from last year's measure. Regarding this we cannot speak positively, as, at the time of writing, the Bill is not available for comparison, though introduced by the Minister of Transport early last week. It is just possible, after what transpired in the Lords, that there will be members of the Lower House who will not regard the measure in the same spirit of equanimity and heedlessness that

The Resuscitated Clauses.

they did last year; and those in the electricity industry who would be satisfied with things being left as they are will see to it that the members of that House are better informed as to what the proposals mean than they were but a few months ago. It would not be a bad thing to remind them also of the lines of the discussion in the Upper House, and of how little the Lord Chancellor knew of the measure of which he, on behalf of the Government, took charge in the Lords.

Financial Revision.

The Statutory Undertakings (Temporary Increase of Charges) Act, of course, covers electricity supply concerns; and many of them have had to come under the shabby protection which it affords. We saw recently how a group of electric light companies—Edmundson's and others—were promoting a Bill in the next session of Parliament to raise their maximum price, and to ensure a minimum dividend if it can be earned within the new maximum. Referring to the Tramways (Temporary Increase of Charges) Bill—to which attention was drawn in the "Journal" for April 6, and which is designed to revise the 1918 Act for the purpose only of tramway undertakings—the "Electrician" states that many electricity supply undertakings were badly hit by the 1918 measure. Of course, the intention of the Act was right if it had not been spoilt by the meanness of the terms, which rendered nugatory the idea of doing something to maintain the stability of the undertakings which had perforce to have recourse to its provisions. It has afforded a notable example of the futility of making inadequate provision for producing a certain result. The Scarborough Electricity Supply Company is an illustration of the effect that the meagre terms of the Act have had. The last dividend declared was only 2¼ p.ct.; and this was the maximum allowed. The Managing Director (Mr. A. A. Campbell Swinton) told the shareholders at their meeting that, if they earned much more than sufficient to pay the dividend, the Electricity Commissioners would tell the Company that they must reduce their prices. Our contemporary's comment upon this is: "Unless this policy is quickly altered, it will kill electrical enterprise in this country. The demand of electric supply companies for authority to increase their charges, so as to give a fair return upon the capital invested, is a just one; and we hope that the Company, as well as Edmundson's Electricity Corporation (who are supplying thirty-five provincial towns) and other companies in a similarly unfortunate position, will be successful in getting the desired powers." Of course, all electric companies have not been so hardly hit, as the dividends of most of the Metropolitan concerns show. The City of London Company, for instance, have brought their dividend back to the pre-war rate of 10 p.ct., and, in addition, two years of the war-rate of dividend are being brought up to 10 p.ct. by a 3 p.ct. bonus. This leaves two years to make good on a future occasion. However, if what our contemporary says is true of electricity supply companies, how much more would the same comment apply to gas companies, with their sliding-scale and low standard prices and dividends, or (in many cases) altogether inadequate maximum prices?

Deficits and Profits.

In the new Bill which the Minister of Transport has lately introduced into Parliament for empowering the raising of tramway charges, one of the clauses provides that no modification in the charges shall be authorized, in the case of any undertakings that are owned by local authorities, which is more than sufficient, so far as can be estimated, to enable the undertaking to be carried on without loss. Another provision is wanted to ensure that all tramway and electricity supply undertakings run by local authorities should regulate their charges so as to provide that they are carried on without loss, and so are not a burden upon those ratepayers who do not use the services. This is especially necessary in the case of electricity undertakings. The "Tables of Costs and Records" issued by the "Electrical Times" at the beginning of this month gave analyses of the annual accounts of electricity undertakings—mostly during the year ended March, 1919; there are a few still figuring in the compilation for the year ended March, 1918. Taking the "Tables" as they stand, it is seen that of thirteen Metropolitan local authorities, five made deficits, and eight surpluses. Of 181 provincial local authorities, no less than 106 made deficits, and 75 surpluses. The thirteen Metropolitan Companies whose accounts are noticed all made profits. The accounts of 49 provincial electric supply companies are analyzed; and 42 show surpluses and only seven deficits. If there is any advantage in local authorities taking up the supply of electricity, it should be shown not only in price, but in the running of the concerns without loss. It is easy enough to sell at a loss if other people can be compelled to make up the shortage of revenue to cover financial obligations. A fool could run a business in such circumstances.

The Saviours of the Situation.

In the second paragraph, allusion is made to the dividend and bonus of the City of London Electric Lighting Company. In addressing shareholders at the recent meeting, Mr. J. B. Braithwaite gave an indication of how the Metropolitan Companies propose to help London to a plentiful supply of electrical energy. It seems that the London County Council want to pull one way; the Metropolitan Borough Councils seem to be a bit uncertain as to whether to link-up with the County Council in a scheme, or to plan one on their own account; and the Companies have other ideas. Mr. Braithwaite believes the City Company will be able to aid very materially in the provision of a comprehensive supply for the London area. Already the Directors have placed orders for large generating units, which will provide for the growth of the Company's own business, and enable them to give a bulk supply to neighbouring undertakings pending the completion of a super-power station down the river, which it is anticipated will form a feature of any comprehensive scheme put forward. The Board have already entered into an agreement with the County of London Electric Supply Company for furnishing them with a considerable amount of current in bulk; and it is hoped to have it available by the end of the year. In Mr. Braithwaite's opinion, the only chance of cheapening the supply of electricity in the London area, is to utilize and co-ordinate the resources of the existing companies. It is estimated that it will be possible to put down additional plant at Bankside to increase the generating capacity to 100,000 kw.; and if proper security is given to the capital outlay of the City Company, it is the opinion of the Directors that they will be able to save the whole of London from running short of electricity during the next three or four years. In the matter of tiding London over the interval which must occur before the projected new power house down the river can be brought into operation, both the City and the County Companies have taken their courage in both hands; and Mr. Braithwaite believes the time will come when the people of London will thank them for what they have done, and will recognize them to have been the saviours of the situation. It will most assuredly be the duty of London to erect a monument to these people in the days to come.

Electric Motor Experiences.

There is no doubt that gas engineers have let the electricians have too much of the talk as to the value of the electric-motor, and its coming supremacy. At the same time, talk will not in the long run destroy the facts of experience; and the experience is that among manufacturers the gas-engine is making satisfactory headway, and for very good reasons. Nevertheless, it is strange that so many gas engineers, having themselves a very ripe experience of electric-motors and of their shortcomings, as well as of their advantages for special purposes, should not do a little more talking as to the truth of the position between the two means of power. The way electrical men speak to the owners of factories of the merits of electric-motors, the latter might be pardoned for imagining that such power machines would run for ever without any attention, and that there was never such a thing as a stoppage of machinery and therefore of output through a breakdown. As a matter of fact (as gas engineers are well aware), electric-motors, convenient as they are for intermittent and isolated running, are very sensitive machines, and must be installed in positions where neither damp nor dust will corrupt, and interfere with their running. Mr. J. R. Duff, the President of the Midland Association of Gas Managers, has told us how he has had, through numerous breakdowns, to discard an electric-motor fixed in a coal-breaker pit, and use an engine above-ground with a chain-drive. The electric-motor requires as much attention as the gas-engine; but the electrical man tries to bamboozle the factory owner with the fiction that the electric-motor, when once installed, will permanently behave itself. That is all moonshine. The danger of breakdown runs from troubles at the electric generating end to the motor, about which there are scattered several seats of breakdown. Fuses, starters, switches, rewinding of the armatures, the renewal of brushes, are among the many matters that require attention, and demand time and labour. Factory owners with several motors installed know that the electrical representations as to freedom from anxiety, labour, and cost for attention need very liberal modification, just as does the boasted economy of electricity. For equal loads and long running, the gas-engine is, experience fully affirms, the more economical, especially at present prices for gas and electrical energy. Running at full load, and with about 16 c.ft. of gas of (say) 500 B.Th.U., gas-engines will give 1 brake horse power per hour. If we take 20 c.ft. as a fair average figure at 4s. 2d. per 1000 c.ft., this would only cost 1d. With electricity 746 watts, or (say) 0·75 unit, are required per brake horse power, and this without reckoning losses. Electricity for ordinary power purposes now costs anything between 2d. and 4d. per unit. For a 47-hour week, 35·25d. units would be required; and this at only 2d. per unit would mean 5s. 10½d. per brake horse power per week. If wiring and other losses are included, the actual consumption would amount to about a unit per brake horse power per hour; and 47 units at 2d. would cost 7s. 10d. per brake horse power per week. The consumption of gas for a 47-hour week would be 940 c.ft. per brake horse power; and this would cost 3s. 11d.—just half the cost per brake horse power of the electric-motor. Gas men have plenty of scope for discounting the power talk of electricians where new custom is concerned, or where there is an attempt to evict gas-engines in favour of electric-motors. Where electric-motors have been installed, although for the particular purpose they may be more convenient than gas or steam engines, the factory owner knows full well that the electrical certificate of merit was a bit overdone.

The Midland Junior Gas Association are to have their annual meeting on Thursday evening, the 29th inst., when general business will be transacted.

ELECTRICALLY-DRIVEN BLAST-FANS.

By H. C. WIDLAKE, A.M.I.E.E., of the Plymouth and Stonehouse Gas Light and Coke Co.

IN bringing this contribution before readers of the "JOURNAL," the author desires to explain that it was originally his intention to include this subject in the series of articles entitled "Gas-Works Power Plant—Judicious Modernization," which commenced in the Aug. 5, 1919, issue; but a natural reluctance to publish particulars of a modernization job whose merits had still to be proved, resulted in this description being held-over until such time as the modernized job was actually on load.

The use of electricity for fan-driving is far too well established to warrant any lengthy description; but the chief interest in this particular work lies in the manner in which the peculiar conditions that exist in a water-gas plant were catered-for without introducing any complications in the controls.

In the above-mentioned series of articles, it was shown that the most promising modernization schemes were those which had the effect of improving the load-factor on the works generating sets, and that well-loaded 24-hour jobs easily headed the list of such desirable loads. These loads are very attractive from the point of view of the generating station engineer, and should be the first to be brought under the electric drive. But it so happened that on the undertaking with which the author is associated the water-gas plant was situated a considerable distance from the power station, and many difficulties—physical as well as financial—attended the running of a feeder-line of sufficient capacity to transmit without a heavy pressure drop the required amount of electrical energy (over 250,000 units per annum) at the somewhat low pressure of 230 volts.

The electrification of the water-gas blast-fans was consequently left out of the modernization programme until such time as the enlarging of the sets in the water-gas plant necessitated the conservation of steam for the supply to the generators themselves. It then became a question of installing additional boiler power or electrifying the blast-fans; and naturally the line of least resistance was taken.

The water-gas plant comprised four gas-making sets served by three No. 8 Sturtevant blast-fans, each driven by a twin cylindered high-pressure vertical engine capable of developing 35 B.H.P. at a speed of 300 revolutions per minute. These engines were of the simple non-condensing type; and while they were excellent so far as actual reliability was concerned, they were cruel steam-eaters, and prevented the gas-making plant from getting an adequate supply of generator steam. It will be understood that these sets were used singly; the two idle sets being held in reserve.

The speed of the running fan was under the control of the gas-plant operators, and each of the four gas-making sets had its own engine control pillar installed on the operating stage. These four control pillars were all mechanically connected with an accelerating valve situated in the direct line of steam-main supplying the three fan-engines. This valve is shown in fig. 1, and its position relative to the three engines will be noted. The crank-shaft of each engine was fitted with a 5-ft. diameter 12-inch face driving-pulley, from which a horizontal belt-drive was taken to the Sturtevant fans.

The method of operation was as follows: With the four stage-controls set at slow speed, an engine would be started-up; and after having been well drained, its throttle would be opened right out. Owing, however, to the fact that the stage-controls were all at "slow," the accelerating valve would be very nearly closed, and the engine would be turning at a speed of about 90 to 100 R.P.M.

When the operator of (say) "A" set desired to put the blast through his set, he would open his speed control as a preliminary to opening his blast-valves. The operation of the speed control would pull the accelerating valve *a* (fig. 1) wide-open; and the engine would speed-up to the full rate of 300 R.P.M., and would continue to run at this speed until the blast was no longer needed by any of the sets. Then—the speed controls having been all put to "slow"—the engine would fall-back to the slower rate of revolution. If, however, the operators of either of the other three sets wished to use the blast before "A" set had finished his blowing cycle, and had accordingly set his control to "fast," the ultimate return of the "A" set control to the "slow" position would have no effect on the speed of the engine, and simply meant that the operator of the "A" set had relinquished his control of the engine in favour of whichever operator had his speed control at "fast." In this manner the control of the engine passes from one operator to another; and, with three sets in commission, it is found that slow running intervals are very few, whereas in the summer season, when only one set is at work, the engine is running slow more than half its time.

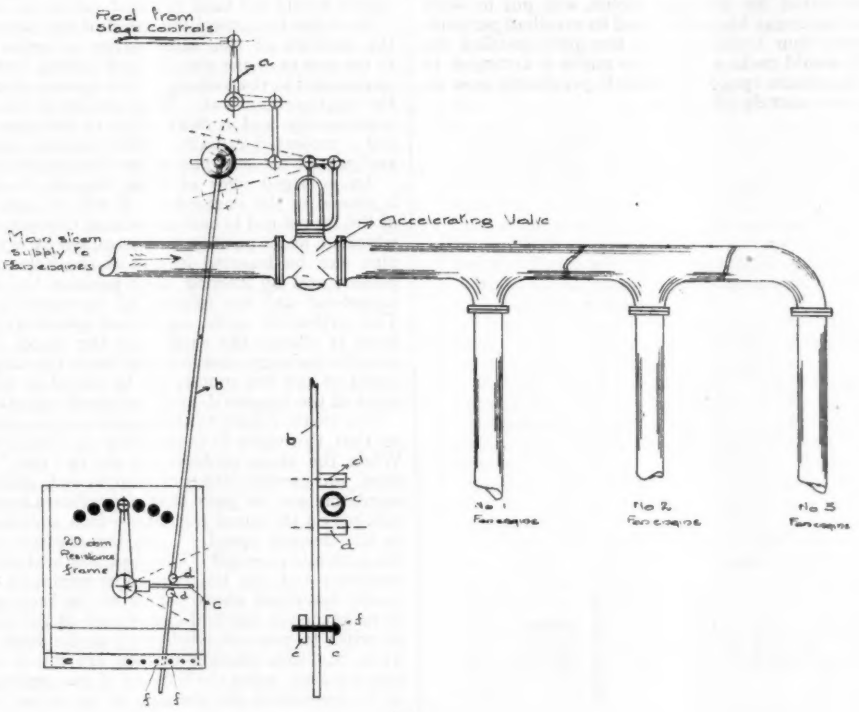


FIG. 1.

It is a very debatable point whether, on the whole, much saving results from working in this manner; and many arguments may be advanced for and against it. If an engine is kept running at full speed without any form of slowing control from the stage, and irrespective of whether or not the blast is required, it is essential that some form of relief-valve be fitted in the blast-main, in order to provide a vent when all the blast-valves are closed. In the winter season, with (say) three or four gas-making sets at work, this vent would scarcely ever be required; but in the light season, the vent would be open more than half its time and the engine would be running (say) at least twelve hours a day at 300 R.P.M., when the slower speed of 100 R.P.M. would suffice. This must entail considerable waste of fuel. But, on the other hand, the continual rapid acceleration and deceleration of the engine (particularly during the light season) over a wide range of speed is bad for the engine, and must curtail its useful life and lead to heavy maintenance charges. It has been contended that slowing-down during those periods when the blast is not required "spares" the engine; but this contention only holds good provided that the speed control is opened-up with far more judgment than the average operator cares to exercise. In spite of the use of screw-motion on the speed-controls, it is surprising how quickly an accelerating-valve can be opened; and the manner in which these small engines are rushed-up to speed may well make a

hardened engineer flinch and discover a sudden urgent engagement somewhere outside the precincts of the engine-room.

In anticipation of the time when one or more of these engines would be replaced by an electric motor or motors, it had long been decided that, while retaining the existing system of speed-control, the minimum speed of the electrically driven fan should be such as would enable it to be rapidly accelerated to the required maximum speed without distressing the entire electrical system, and the windings of the fan-motor, by heavy periodical current surges. It was further decided that, subject to the fulfilment of the above conditions, the slow running speed of the fan should be such as would maintain within the blast-main a pressure (static working) of about 2 or 3 inches below the pressure required when the blast-valves were opened and the fans were running fully loaded. In this manner the necessity for a relief-valve on the blast-main was avoided, as was also the necessity of installing a motor having a very wide range of speed regulation.

When the time arrived for the electrification of the water-gas blast-fans, the question as to the type of motor decided itself by the presence on the works of two small 45 kw. generating sets which had become too small for further service in the works power station. The sole reason for the condemnation of these sets lay in the fact that they had become utterly inadequate to deal with the works' demand for electrical power; and bearing in mind the dual characteristics of the dynamo and motor, it was realized that the dynamos were worth far more viewed as 50 b.h.p. motors than the complete sets would fetch if thrown on the second-hand market.

One of the generators, by the Electric Construction Company, has now been converted for use as a motor, and put to work driving one of the water-gas blast-fans; and its excellent performance, working twenty-four hours per day, has quite justified the expectation that it would make a first-class motor if arranged to run at the same maximum speed at which it previously gave its full output of 45 kw.—namely 560 r.p.m.

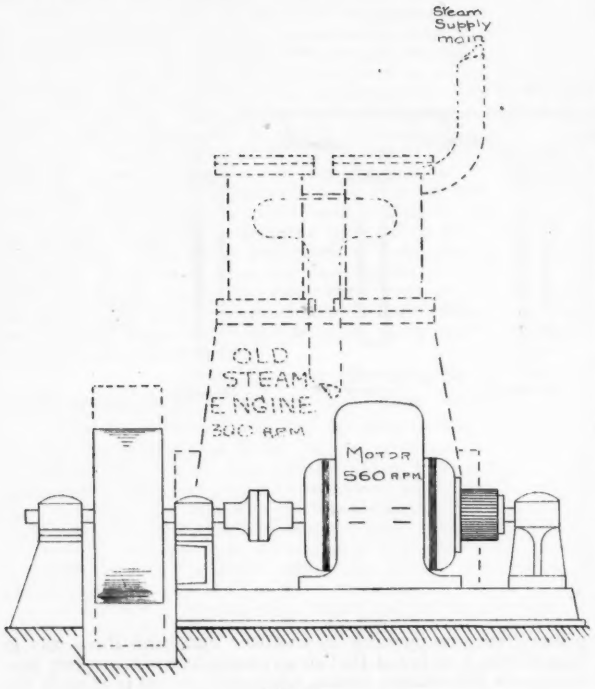


FIG. 2.

The dynamo was installed as shown in fig. 2, with its 32-inch diameter driving-pulley in the same position as was previously occupied by the driving-pulley of the vertical engine (whose outlines are shown in dotted lines). On each side of the driving-pulley, substantial self-oiling bearings were fitted; and the belt-drive having been completed, a number of experiments were carried out with a hand-regulator, with a view to determining the characteristics of the converted dynamo before going further in the matter of arranging for its remote control from the operating stage.

A multiple-lever switch-panel was installed for the purpose of starting the set; and it was found that with full field-strength, the motor ran at a speed of 390 r.p.m., giving the fan a speed of about 1250 r.p.m. At this speed, and with the fan outlet disconnected from the blast-main and the shutter open, it was found that the set absorbed about 45 b.h.p., and any attempt to speed-up by shunt-regulation resulted in serious overloading. It was obvious that with a free outlet the fan was short-circuiting (so to speak) a very much greater volume of air than that with which it was designed to deal; and under these conditions its behaviour was analogous to a short-circuited electric generator. The gradual closing of the outlet shutter reduced the load on the motor; and with the shutter on the delivery fully closed, it was found that the power required to drive the impeller at 1250 r.p.m. had fallen to about 14 to 15 b.h.p. At this speed, and even with the shutter closed, no objectionable hunting or vibration was noticeable in the working of the fan.

The connection between the fan outlet and the blast-main having been made, the fan was put to work on its legitimate load, controlled by a temporary shunt hand-regulator; and it was found that the motor speed at which the fan would maintain a working water gauge of 18 to 20 inches in the blast-main was 560 r.p.m., which speed was attained after the insertion of about 20 ohms in the field-winding of the shunt-wound motor. It was also noted that, however quickly the field strength was reduced by the insertion of this resistance, the machine swung-up to full speed without distressing the system in any way.

The necessary amount of field-resistance having been ascertained, a special field regulator was designed to operate in connection with the existing stage-controls. The method of operation will be clearly seen in fig. 1. This shows the lay-out of the main steam-supply pipe, from which the existing fan-engines derived their supply, together with the three branches falling down to the engine stop-valves. The steam on its way to any one of the three branches passed through a weight-loaded accelerating valve which was actuated by the four stage-controls through the bell-crank *a*. When one or more of these controls was set at full speed, the weight-loaded valve-lever was raised to the limit of its lift—thus opening the valve and allowing the running engine to attain its full speed. Upon the controls being returned to the slow running position, the weighted lever would bring the valve nearly back on its seating, and the speed of the engine would fall back to about 100 r.p.m. or less.

In order to control the speed of the motor-driven fan through the medium of this same device, a tappet rod *b* was connected to the centre of the weight; and falling vertically, its lower end terminated in the vicinity of the special shunt-regulator fixed on the engine-room wall. This regulator was fitted with a radial contact-arm, and at right angles to this arm a light piece of steel rod *c* projected radially. This rod was insulated by fibre tube, and passed between two adjustable tappets *d*.

An enlarged view of these tappets fixed on the tappet-rod is shown in the engraving. It will be seen that the bottom end of the tappet-rod is accommodated between two guide plates *e*, in which its exact position is determined by a pair of pins *f*. These pins can be inserted in any of the holes drilled in the guide-plates; and by altering their position the distance between the tappet-rod and the fulcrum of the regulator arm can be varied. The vertical lift of the tappet-rod operated by the weighted valve-lever is always the same; but the travel of the regulator arm over the resistance notches, and hence the maximum and minimum speed of the fan motor, can be varied at will by vertical adjustment of the tappets *d*, and horizontal adjustment of the pins *f*.

The steam supply to the engine-main is shut off at the boilers; so that the valve is inoperative so far as steam is concerned. When the stage controls are set to "fast," the weighted valve rises, and carries with it the tappet-rod, which in turn causes the regulator arm to pass over a predetermined number of speed-notches on the shunt regulator—thus speeding-up the fan motor to the desired speed. Upon the controls being set to "slow," the action is reversed. The regulator arm returns to the full field position; and the fan falls to its minimum speed. The adjustments described above permit of the keeping of a small amount of resistance in the field-circuit even at the slow speed, if desired, in order to prevent overheating of the fields in the light season, when the slow-running periods are much longer than in the heavy season, when the number of gas generators at work is such as to necessitate the running of the set at full speed practically all the time.

The installation now described has been at work for the last seven months, running day and night, and has never given a moment's trouble. It will be understood that the speed of the fan is arranged to vary between 1250 and 1800 r.p.m., and that this variation is obtained solely by shunt-regulation. There is little doubt that a lower "slow" speed would be desirable. But it will be understood that the wider the difference in r.p.m. between slow and fast running, the greater disturbance is likely to be caused to the system during the accelerating period; and this disturbance would, of course, be felt all over the works.

The installation was put to work in a hurry, with the materials which happened to be available; and it has served, and will doubtless continue to serve, its purpose very well. At a later date, however, it is the author's intention to instal a dash-pot regulated solenoid accelerator of special design, which will be operated by one of four pilot-switches fitted to the blast-columns on the stage, and interlocked with the main blast controls. The main accelerator solenoid will take about four seconds to perform its stroke, during which time it will (*a*) cut-out a series resistance in the armature circuit of the fan-motor, thus increasing the speed from 100 to 390 r.p.m., and (*b*) insert, by eight steps, 20 ohms in the field-circuit, thus increasing the speed from 390 r.p.m. to the maximum of 560. With the dash-pot controlled accelerator it will be impossible to rush the set up to speed; the time taken in acceleration depending upon the setting of the oil-valve in the dash-pot. By this method, the advantages of slow running will be realized without the attendant danger of damage and disturbance caused by reckless acceleration.

It may be mentioned that the power absorbed by the No. 8 Sturtevant blowing-fan when running at full speed (1800 r.p.m.)

varies between 30 and 37 B.H.P.; while the net saving in fuel amounts to about one ton per day.

The author trusts that these details of a conversion job may be of interest to readers of the "Journal;" and he desires to express to Mr. Percy S. Hoyte, the Chief Engineer of the Plymouth and Stonehouse Gas Company, his appreciation of the courteous permission which has enabled him to publish these particulars.

THERMOMETRY IN GAS-WORKS.

By Geoffrey Weyman.

It is somewhat remarkable that temperature as a means of control is not more used in gas-works than it is. Control by this means is in some cases essential, and in others a means of saving both time and trouble. It is easy enough to read thermometers, but another matter to interpret and apply the results. It is not sufficient to read thermometers daily; but the information they supply must be immediately put into use to obtain results. A proper system of obtaining a complete set of temperature readings throughout a gas-works will lead to far-reaching economies.

The expense of such an installation may be at first sight somewhat heavy; but, after all, if the system only saves emptying one purifier in six months, or enables washing plant to carry on for longer periods without cleaning, the first cost must be considered remarkably small.

As a rule, the thermometers must remain in position; and it is therefore necessary that the glass of glass-mercury thermometers must have been properly annealed. The ordinary plug thermometers so often used are of no practical use. The thermometer bulb shakes loose from the scale, and so alters the zero. The temperature recorded drops appreciably during the time necessary to withdraw and read it. The socket protection as a rule is too short, and does not project far enough into the main to obtain a correct reading; while the protection afforded causes "lag." The metal socket also causes a low reading, owing to its power of conductivity. They often alter "zero" after a time, even though correct to start with, and must then either be corrected each time the reading is taken or the thermometer discarded.

Dial thermometers are superior in many ways, if the stem is sufficiently long; but they are also liable to "zero" alteration.

The straight-stem thermometers properly annealed and protected, but not enclosed in a metallic casing which is screwed direct into the gas-main, are reliable and satisfactory, although they need checking after a few months' use. Their drawbacks are the awkward places which the observer must often reach, and the number of breakages which occur.

The latter difficulties can be got over by installing electrical resistance thermometers coupled to a switchboard in a convenient place. Provided that a number of thermometers (none of which are far removed) can be coupled to the same board, the first cost—including wiring—is not far removed from the cost of installing a similar number of good glass mercury thermometers. The resistance thermometers are quite as reliable, and as a rule more sensitive, than the usual type of glass mercury thermometer. The fact that the switchboard can be placed where there is always an attendant is a great advantage, as the temperature control can be maintained day and night. It only needs the insertion of a plug into each of the different sockets, and a glance at the indicator at certain intervals, to obtain an accurate record. The only disadvantage is in the number of wires—one for each thermometer and a common return—which lead away from the switchboard. If any alteration has to be made to the structures along which they are led, the wiring has to be taken down and re-suspended. In ordinary circumstances, it is not advisable to place such thermometers more than about 100 yards from the switchboard.

Many of the thermometers should be recording; and in this respect a central switchboard is useful, since any one of the thermometers can be connected to the recorder as desired—thus saving the necessity of installing so many separate recorders and shifting them about.

Dealing in turn with the points in a system of temperature control, the coal-store is the first locality for installing reliable thermometers. It is essential that there should be a number of points taken for the insertion of thermometers, and that they should be practically continuously under observation. Often there are but a few hours between the start of the heating-up of the coal and an outbreak of fire.

The retort-house is essentially a place for temperature control. Under modern conditions, it is often desired to work as near as possible to the limit of temperature. The temperature in a heating flue must rise as near as possible to the melting point of the material lining it; and an average working temperature difference may be as close as 200° C. The number of chambers under observation is too great for fixed pyrometers; and recourse must be had largely to eyesight. It is a wise precaution to check the eyesight at regular intervals, and to use a pyrometer in all doubtful cases. It is preferable to have the records put down in round figures (although they may be judged by eyesight), rather than merely stated as "good," "bad," or "indifferent."

Where waste-gases collect in one main, it will save trouble and loss of heat through incomplete combustion if a recording pyrometer is placed in the flue. Such an installation would in many cases be a step towards waste-heat recovery.

The first temperature taken of the products of carbonization should certainly be that of the gases leaving the retorts; and the second should be that at the point where the tar is taken away from the gas-mains. Troubles with pitching-up, and the presence of large quantities of ammonium chloride in the tar, can be solved by control of these temperatures.

The next point—the inlet of the condensers—is also important, as showing the work thrown on them; and it has some relation with the formation of emulsions of water and tar. Any large variation here makes the control of the outlet temperature a matter of difficulty, and is usually due to trouble in the retort-house.

The regulation of condensation is entirely one of temperature. With air-condensers, the temperature of the atmosphere is naturally an important factor, although uncontrollable. Control can only be exercised by shutting-off or putting-on sections so as to maintain the desired outlet temperature. Water condensers are more subject to control, and are a means of economy; for the hot water can be conveniently used for boiler-feed. The physical heat of the gas can thus be largely recovered. In one example it amounted to over 0·5 p.ct. of the heat of the coal carbonized. Naturally, the quantity of water used for steam-raising is a fixed amount; and it is usually an advantage to have the feed-water raised to the highest possible temperature rather than a larger amount of water at a lower temperature. The maximum temperature obtainable with efficient water-cooled tubular condensers worked on the counter-current system is within a few degrees of the temperature of the inlet gas. The outlet condenser temperature is of essential importance. It can naturally not fall below the temperature of the air for air-condensers or water for water-condensers. If water-spray is used on air-condensers, a reduced temperature can be expected, due to the cooling effect of the evaporation. But this is only of importance if the condenser is out in the open. The best outlet temperature to aim for depends very much on the character of the washing-plant following, as well as the type of condenser. For instance, an outlet temperature of 75° Fahr. with air-condensers may allow too much tar-fog forward; but in the case of water-cooled condensers there may not be the same trouble. With poor washing plant 70° Fahr. may be too high in summer for the removal of the ammonia, as the finished liquor will run too weak for the subsequent working-up. With exposed plant the temperature in winter may drop too low for efficient purification.

Since the absorption of ammonia in water is a function of the temperature, the need for indication at the inlet and outlet of each set of washers or scrubbers is apparent.

For the removal of hydrogen sulphide and other sulphur compounds with oxide of iron, there are two conditions which must be maintained to render the process economical. First, a temperature at least above normal; secondly, one or two grains of ammonia in the gas. It is not an easy matter to regulate the passage from the washers or scrubbers of one to two grains of ammonia per 100 c.ft. of gas year-in and year-out. It is certainly impossible if the temperatures are not controlled.

In gas purification, it is not only necessary to know the inlet and outlet temperatures at each set, but also the temperature of the oxide in each box. In the latter case, the thermometer bulb must be well in the centre of the mass. With boxes holding trays of oxide, there should be a thermometer in the oxide of each tray, or at least in the tray in each box which is most liable to heat-up. Without such observation, purification becomes merely a process of trial and error.

Station meters also need thermometers to give the correction temperatures. It is also worth while to record the temperatures of the gas before and after any compression and release. The temperature of the gas passing into the district is also important. In fact, if temperature gradients were constructed for the gas passing along the mains from works to consumers throughout each period of the year, the course of naphthalene and syphon liquor deposition could be followed, and probably a good deal of information derived on the subject of corrosion.

Patents Legislation.—Messrs. Butterworth & Co., of Bell Yard, Temple Bar, forward a copy of a book just published by them on the "Patents, Designs, and Trade Marks Acts," with notes on all recent decisions and changes in law and practice. The authors are Messrs. H. Fletcher Moulton and J. H. Evans-Jackson, Barristers-at-Law; and the price is 17s. 6d. net. In the introductory chapters the authors show the effect of all important decisions since 1912; and they have also summarized in these chapters the changes introduced by the recent Acts. In the case of patents, the introductory chapter is divided in accordance with the system adopted in Fletcher Moulton's "Law and Practice Relating to Letters Patent for Inventions;" so that the present book brings this completely up to date, and incorporates all reported cases to the end of 1919. In the later chapters of the book there is reproduced each section of the main Acts, both in the earlier and amended forms; and notes are added as to the effect of the many and important changes that have been made. This brief explanation of the contents should be sufficient to recommend the book to those who have any concern with the Acts in question. By consulting it, the benefit of much labour can be secured with a minimum amount of trouble.

MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

A SPECIAL MEETING.

At the close of the annual general meeting of the Association last month, it was arranged that the discussion on "Gas and Housing Schemes" then opened by Mr. R. J. Rogers, Fittings Superintendent of the Birmingham Corporation Gas Department, should be continued at a future meeting; it being felt that more still remained to be said upon this topical subject. A special meeting for the purpose of resuming the debate was held last Thursday afternoon in the Grand Hotel, Birmingham, when some twenty members were in attendance.

The chair was occupied by Mr. James R. Duff, of Banbury, the President of the Association.

GAS AND HOUSING SCHEMES.

Mr. R. J. Rogers, before the discussion was continued, gave a *résumé* of the proceedings at the last meeting. He said that since then he had been reminded that some gas undertakings had secured power under recent Acts to insist upon the fixing of certain sized pipes; but this power did not exist generally.

Mr. Samuel Glover (St. Helens) remarked that the aims and objects of Mr. Rogers were of great interest to him. They should see that their specification for piping was accepted by architects; and he thought there was much more hope now than ever before of this being done. It was a fact that architects were driven by force of circumstances to acknowledge that gas was a thing they had to reckon with. He had already advised gas engineers to let it be widely known that they were willing to place their services at the disposal of those who were working these matters out. There were a number of questions to be considered. They had to decide whether it was advisable to lay mains on each side of a road, so as to avoid for all time the possibility of having to open-up across the road to search for and repair a service. Other things were the position of the service; and the point at which the gas authority should insist upon finishing such part of the work as was supplied free of cost, because up to the time of the war gas undertakings had been laying services free of cost, in the case of small gardens at least, up to the premises. They must make sure that the plumbing contractor was not allowed in any way to skimp his work and cut things down. But circumstances altered cases; and he did not see how enthusiasm in one place—even if it were a big place—was going to affect the relationship of gas undertakings with architects in other places. There were some architects and contractors connected with what might be called Garden City schemes who tried to forget altogether about gas. They thought that when they had suggested a common hot-water supply and electricity, they had pronounced all the words it was necessary to utter in order to charm people into leaving the whole scheme to them. He knew of schemes where, until they had realized the need for it on the job, they had totally ignored gas, even in these days, and notwithstanding all that had been done. The obligation that architects were now under to reckon with gas was emphasized by the fact that they found they could save substantially on the cost of building each house, by avoiding the construction of massive chimney flues and breastings, and substituting special gas-fire flues. It was known now how they could construct within the wall space for these housing schemes a flue which was quite sufficient to ventilate a gas-fire. In many cases schemes were being submitted to the authorities which it was understood were likely to prove more acceptable because of the fact that they had cut-down the cost by providing special gas-fire flues. Gas undertakings had therefore a better chance now than before of being recognized as somebody to reckon with. When the gas industry was re-established on proper lines—as it would be re-established—he hoped that the gas used would be profitable in proportion to the added cost of the gas-consuming appliances that undertakings had had to provide for the purpose. He had to think to-day along these lines, because architects in drawing-up building schemes for the Corporation of St. Helens were remembering that for the last 25 or 30 years the gas undertaking had supplied all gas appliances of standard patterns free of rent. They were therefore going to apply a ventilating system that would necessitate the use of gas-fires; and all the housewives and their daughters in the town had been so educated up to the use of gas for cooking, that there would be no happy occupants of these houses—however pretty they might be from the outside—unless they contained a gas-cooker. He quite expected that, when things were put on a proper basis, gas would do quite as well in the future, on the new terms, as it had done in the past. The providing of electricity for lighting might be all very well where they could afford to do it; but seeing that gas must of necessity go into the houses from an economic standpoint, piping should be provided for lighting. A house was not a house in the proper acceptation of the term unless it was piped for a supply of gas for all the purposes that it could now be more successfully applied to than ever it had been before. He did not want them to regard this matter in any doubting or hesitating manner at all. They were, he believed, going to provide for these housing schemes more gas per house than they had ever supplied before.

Mr. B. W. Smith (Walsall) said they had a housing scheme in his town, which was getting on very slowly; but he was glad to say that electricity had not made much headway. It would be necessary to spend something like £750 to lay a cable in an outlying, poor district to supply sixteen houses. A gas supply was to be furnished for cooking, which was as far as they had got at present; but he was happy to say the view now taken by the surveyor and other people connected with the scheme was that the one service would be quite sufficient for the requirements of the house. In carcassing, they were adhering to the gas undertaking specification; and there had so far been no difficulty about it.

Mr. C. H. Carder (Oldbury) remarked that in his own case the surveyor wanted on a new estate to prepare the whole of his roads, some of which would not be remunerative from the gas supply point of view for a period of about three years. He (Mr. Carder) did not therefore feel inclined to advise his Committee to lay out the money for the mains, unless they could secure at any rate 6 p.ct. on the outlay. He had been discussing the matter with Mr. Rogers, who had given him some information as to the system adopted by Birmingham in connection with supplies to ordinary industrial concerns. Since the last meeting, also, he had had an opportunity of collaborating with the architects of a private, as apart from a municipal, housing scheme. The result was that there were gas-fires in all the bedrooms, and a gas-range. The people were standing the cost of everything from the main; and it looked like about £50 a house.

Mr. Smith, referring to the remarks just made, said he should have stated that in Walsall they had laid down a definite order, and it had been accepted, that for all new mains for the accommodation of the housing scheme, other than in thoroughfares which were already canalized, the housing authorities should pay 10 p.ct. on the capital outlay, until the mains became remunerative.

Mr. F. Robinson (Swadlincote) said that, as bearing upon the subject under discussion, he had been going into the question of the cost of pipes; and he found that during the last few days the cost of cast-iron pipes had been put up 30s. per ton.

Mr. W. S. Morland (Gloucester) said that there was no doubt whatever in his mind that the gas industry had suffered, and was still suffering, very much from small gas-pipes in houses. This had been his own experience. Numberless houses were originally fitted-up for the purpose of supplying gas to flat-flame burners for lighting only. Later on came the use of the gas-cooker, and then the gas-fire. His Company did not do gas-fitting in houses; and it was left to the local gas-fitters to simply instal these additional appliances with still the same sized service. This had been an everlasting cause of complaint. People declared that the trouble was "bad gas;" whereas it had nothing to do with the gas, but was due to insufficient supply through pipes which were too small. The real cause did not occur to them; and when consumers had the only remedy pointed out to them, they would not adopt it. The industry had incurred unpopularity from this cause; and it occurred to him that they should make the matter more generally known. They were aware that architects were not altogether practical men in these matters; and if the Institution of Gas Engineers were to draw up a specification for the whole country, and circulated it among architects, or the Architects' Institute, he believed it would help these gentlemen very much. They would simply turn to the specification, which would be generally applicable, and say: "It is going to save me a lot of trouble. I will follow the specification." This would greatly improve matters. There were now hundreds of architects with hundreds of different ideas as to what was a sufficient size for pipes.

Mr. Glover: Have not the British Commercial Gas Association already done this? It seems to me it is quite along the lines of their duty to the industry.

Mr. Morland replied that he had never seen anything of the kind. If it came from an authoritative body of the industry, it would carry more weight than if it emanated from an individual engineer or from an individual town. This was his point. Something should also be done to impress upon people that existing houses were frequently not adequately piped.

Mr. Carder, alluding to the "educating" of architects, said that he had procured from the British Commercial Gas Association a number of copies of all the issues of their "Thousand-and-One Uses for Gas" which dealt with the question, together with their special booklet on "Gas for Housing Schemes;" and these he had had bound up and sent to the architects of the town. It seemed to him not a bad idea.

Mr. C. H. Webb (Stourbridge) said in his case the services were all short; and they had given them without charge. They were a Corporation Gas Department; and their own Corporation were building the houses. They were being paid for all the carcassing, so much per point; and the Surveyor (who was the architect) was providing the wash-boilers and the bath-heaters. The gas-cooker was optional; but the Gas Department were putting in a point for a cooker. The actual lighting fittings the Surveyor was also providing. It was a strange custom in his district that the tenant provided his own fittings. In this case, the fittings would be part of the equipment of the houses.

Mr. Rogers Replies.

Mr. Rogers then replied to the whole discussion, dealing first at some length with the remarks which were made by the different speakers at the previous meeting. He said that, to satisfactorily wire a house for electric lighting would cost more than for fixing gas-supply pipes; and even if the houses were wired for electricity, the great majority of the tenants would demand a gas coking-stove or wash-boiler. Remarks in the electrical press made it apparent that there would be a big effort by electricity undertakings to get electric light adopted in local housing schemes. In a recent issue of the "Electrical Times," reference was made to this subject; and after describing the source of revenue which would follow if all the new houses were electrically lighted, the writer stated: "This is for lighting only; heating and cooking will follow. But lighting is the thin end of a very big wedge, to be inserted at all costs." He continued: "Let gas-cookers be installed if it cannot be helped; but get the electric lamp in. The whole history of electricity supply shows that lighting is the advanced guard; the other uses follow." To anyone who had studied costs of installation, it was fairly obvious that, with the small current consump-

tion for lighting only, the electricity undertaking would receive very little return for the large capital outlay on mains and service cables. In fact, it was very doubtful if the proposition to instal electric lighting only was financially sound, if all costs were fairly taken into account. However much gas people were prepared to meet fair competition in connection with the installation of lighting in new houses, it behoved all of them to keep a careful eye on this business, when they knew that some electrical undertakings were prepared to "get in" with lighting "at all costs." Mr. Ferguson Bell stated that his practice in Derby was to put in a service and fix a shilling-in-the-slot meter. Could he not prevail on the authorities to allow him to fix also a gas-lighting position in the living-room? The cost of this would be almost negligible, when running the gas supply-pipe to the cooker and wash-boiler; and if the position was in, there was a good prospect for inducing the tenant to use gas lighting for the living-room, where, as a rule, the lighting was required for a larger number of hours than for all the other lighting positions in the house put together. In the size of house under discussion, it must not be forgotten that the warmth from the gas-burner was much appreciated by the tenants. Referring to prepayment meters, in his opinion there was likely to be a greater demand for shilling-in-the-slot meters than ever before, owing to the fact that gas appliances were now being installed which consumed more gas than formerly, and to the greater cost of gas necessitating more frequent insertion of pennies. The altered value of money had to be taken into account; while the lessened weight for meter collectors to carry was also another advantage which would accrue from shilling-in-the-slot meters. The question of gas-fire positions should not be lost sight of in those houses where electricity was being adopted for lighting purposes. Whatever advantages the authorities might claim for electricity as an illuminant, they could possibly compete on economic or efficient lines with gas for heating purposes. Gas-fires were now so commonly used for parlour and bed-room heating that the various housing authorities should be urged to arrange for gas-fire supply-pipes to be laid when the houses were being built, and so obviate the necessity of taking-up floor-boards, &c., after they were tenanted. Assuming that local authorities were really sincere in their demands for a purer atmosphere for cities and towns, surely it was not asking too much for them to provide gas-fire positions in the houses of the future, and so give their practical support to the efforts being made in the interests of smoke abatement. If desirous of helping to solve the problem of smoke abatement, the Ministry of Health, too, could easily make it compulsory that only one coal-fire should be allowed in each house—the remainder to be supplied by gaseous or smokeless fuel.

The financial question of whether gas undertakings should provide appliances and fittings for new houses was all-important. Personally, he did not see why the housing authorities should hesitate to pay for the supply and fixing of gas-cookers, wash-boilers, and lighting fittings in the new houses. The reason why some hesitated was no doubt due to the practice in past years of gas undertakings providing and fixing fittings free of charge with pre-payment meter installations. The circumstances under which these were fitted were, however, vastly different from those obtaining to-day. Gas undertakings in years past had provided fittings and appliances free of cost, in order to demonstrate to new consumers the advantages of gas; but the financial position of most undertakings to-day, and the high cost of materials—both caused by the war—rendered it necessary for the subject to be dealt with in the light of existing conditions, and quite apart from what had been done hitherto. It was desirable that there should be concerted action by gas undertakings in this matter. Mr. Paterson told them at the last meeting that the financial aspect of the housing question was being dealt with by the British Commercial Gas Association, and that agreement to some extent had been arrived at with the Director-General of Housing. This was all to the good; but they, as a District Gas Association, might with advantage appoint a small Committee to represent the views of the Midland Association to the District Housing Commissioner of the Midlands. By doing this, they could not lose, and they might gain something. The District Commissioner was the man who had to pass the plans in the first instance. They were not in any trouble whatever in Birmingham; but he suggested it for the benefit of the smaller undertakings. It might do much good if a deputation went, with the weight of the Association at their back. The British Commercial Gas Association were in touch with the Ministry of Health, and were doing splendid work; but it was not only headquarters that had to be got at. The British Commercial Gas Association had just published a memorandum on the financial aspect of gas supply in connection with new housing schemes, in which they suggested a basis for determining the sum that needed to be obtained from the housing authority as a contribution towards installation costs. This memorandum came at a very opportune time, and would undoubtedly be a benefit as suggesting the lines on which the application should be based for financial assistance from the housing authorities. For many years past the practice in Birmingham with respect to the payment for outlay on main extensions had been to ask the applicant for a gas supply to pay interest on the capital outlay of the main extension till such time as his consumption had reached a figure which would give the undertaking a reasonable return on the ontlay expended, based on the profit per 1000 c.ft. received from the consumer—the interest charge to be reduced in proportion to the amount of gas consumed per annum from the main, whether consumed by the original applicant or by other persons who might subsequently receive their supply from the main. When the gas consumption reached a figure which gave the return required on capital for the main extension, no interest charge was made to the consumer. If any action was to be taken, now was the time. They wanted to get the gas supply-pipes in when the houses were being built.

As to mainlaying, he thought it would generally be found advantageous—especially where the houses on each side were a good distance back from the roadway—to lay a separate main under each footpath. For some years past the practice had been almost universally followed in Birmingham of laying a main on each side of the road under the footpath. At one time in Birmingham they insisted on a separate service being laid to each house; but in recent years they had adopted the method of laying one service to supply two houses when the meter positions in the two houses were back-to-back. The services inside the houses were laid in such a manner as to indicate to a fitter who might be called upon to clear the service of any obstruction that the service supplied two houses. With the modern method of erecting the building-line at greater distances from the gas-mains in the public highway, there would be, for reasons of economy, a greater tendency on the part of gas undertakings to lay one service to supply two houses. In Birmingham, he was advocating, in certain instances, the laying of a 1¼ or 1½ in. gas-service to supply two houses; and in order to prevent the possibility of accidents arising from fitters using a force-pump to clear a service in one house before turning-off the main cock in the adjoining house, he proposed to fix on each service-pipe, close-up to the main-cock, a light circular casting with a white enamelled front, bearing the words "Warning" in red letters, and "Joint Service" in black letters.

Realizing the necessity of educating architects and builders in the various uses to which gas could be put in lighting, heating, cooking, and providing hot-water, the British Commercial Gas Association had devoted special attention to this subject, and had published excellent pamphlets for the information and guidance of architects. Members should not only take full advantage of this literature, but should supplement it and the special advertisement work of the "B.C.G.A." by getting into close touch with architects in their districts. Special attention had been paid to this in Birmingham for many years past; the New Buildings Inspector calling periodically on all architects and builders. Local architects now consulted the department very frequently in connection with the installation of gas in buildings. The position for meters was pointed out to architects and builders immediately the department knew of a new building being started or contemplated. The Corporation insisted, as far as possible, on the meter being fixed next to the front wall of the building, and did not allow gas-services to run under floor-boards of a house before reaching the meter. All the gas service-pipe inside the building must be visible to the meter inspector, so that its condition might be readily observed, and any signs of corrosion be promptly dealt with.

It had been stated at the previous meeting by Mr. Webb that he and other gas managers would be glad to avail themselves of the services of well-trained gas-fitters. If the industry was to give the best service to its consumers and establish permanent business, it must see that due provision was made for training gas-fitters. All gas undertakings were not in a position to conduct training classes and schools for gas-fitters; but every one could to a large extent provide for the future by seeing that suitable youths were employed as mates to fitters, to ensure them getting a number of years' experience working by the side of a fitter on their own districts. Last spring, in Birmingham, they established a day training school for giving the junior fitters who had been serving in the forces a course of practical training, assisted by a lecture course. It proved of great benefit; upwards of ninety fitters passing through the school. They were at present arranging the final details for the training of twelve demobilized soldiers who desired to learn the trade of gas-fitting. The Ministry of Labour (Birmingham Training Section) had selected this number of demobilized soldiers, who were to be approved by him (Mr. Rogers) for training as gas-fitters. The course would consist of at least nine months' daily workshop training under a competent instructor; and, in addition, a series of lectures would be given by experts in various matters connected with gas supply and fitting work. Short courses of work on actual gas-fitting on the district would also be arranged. The local Gas-Fitters' Trade Association had given approval to the scheme; and it was hoped to afford these men a thorough training, and thus, in common with other trades, to show appreciation of, and give practical support to, the men who had helped the country in the hour of need. If any Midland undertaking wanted a good fitter afterwards, there was no reason why men should not go from such a training centre as this to other places. It was only by co-ordinated effort in all gas supply areas that they could expect to reap the greatest return in gas consumption in their several areas. It was surprising to find the amount of ignorance which was displayed by all classes all over the country in the services which gas could render; and the best way to inform the public was by publicity. If they were to obtain the maximum results, all undertakings, large or small, must take their share in advocating and promoting the claims of gas for various purposes. There had never been a period in the history of the industry when mutual co-operation among gas engineers had been so necessary as at the present time.

Coming to the question of flue ventilation, there was one aspect that they would have to watch. It had recently been brought home to him by an observation of their Medical Officer of Health, who was most particular in seeing that as much fresh air as possible was obtainable in the bedrooms of the working classes specially. Discussing this question of the gas-flue (which was smaller than hitherto), he had expressed the opinion that they were not getting sufficient air through it from the room. He (Mr. Rogers) had therefore suggested, in order to meet the wishes of the Medical Officer, that just below the ceiling level they should put in an air-brick or a specially-designed concrete flue-block domed over the top, so as to induce the products of respiration and everything else from the upper part of the room to ventilate through the flue. If they could incorporate something of this nature with the flues, they would have a much stronger case; and he thought in Birmingham the idea would be acted upon, if they could secure the adoption of these flues. The industry had, to his mind, lost a splendid opportunity by not having a practical demonstration of this form of building construction at the present Building Trades Exhibition. As to a specification for the guidance of architects all over the country, the British Commercial Gas Association were, he believed, now at work on this. They were considering a specification suitable for certain types of houses. The architects were to be given some main guiding points.

Mr. R. S. RAMSDEN (Leamington) asked whether in any schemes the provision of gas-fittings by the gas supply authority was sanctioned, and orders given to the gas undertaking to supply the fittings.

Mr. ROGERS replied that he did not know of any gas company who had actually got orders for fittings from the housing authority.

Mr. HUGHES said he had received from the housing authority an

order for gas-cookers and wash-boilers. Lighting fittings would be included, so far as slots were concerned.

It was agreed, on the proposition of Mr. C. M. D. Belton (Shrewsbury), seconded by Mr. Ramsden, to act on Mr. Rogers's suggestion to appoint a small Committee to meet the District Housing Commissioner and place their views before him.

On the motion of Mr. Glover, seconded by Mr. Morland, a Committee was appointed, consisting of Messrs. Rogers, Carder, Ramsden, and Webb, with the President and Secretary.

The President said they were deeply indebted to Mr. Rogers, to whom he proposed a very hearty vote of thanks.

Mr. B. W. Smith seconded this, and it was cordially passed.

COAL SUPPLIES.

The President reminded the members that at the last meeting it was decided that they should communicate with their members of Parliament with reference to the shortage of coal. This had been done; and he thought that in a great number of cases a vast amount of good had resulted. ["Hear, hear."] Questions had been asked and answers given about the position of certain works. He did not know how things generally stood at the present moment; but personally he was living from hand to mouth.

Mr. Samuel Glover said he for one was very glad to hear that the steps which were taken to encourage the members of Parliament to do their duty to the gas consuming public and the gas-providing authorities in this matter had been such that it had been possible to see a result from them. The gas undertakings of the country had been too ready to allow it to be assumed that the gas industry was prepared to accept the position which had obtained during the latter period of the war. What they had put up with in the matter of the quality of coal, they were not going to have anybody assume they were willing to let be regarded as a precedent. The mixture that was being sent out at the present time under the name of coal from some centres was not to be accepted by gas undertakings as coal in the proper sense of the word. It was, however, very important that they should not allow any precedent of this sort to be set up. They should protest and teach those who needed it what ought to be done in this matter. He had been much surprised to see in the current issue of the "Gas Journal" the phrase: "Now that the practice of paying for all the material raised has become established among miners." Whatever might be the case among the miners, he hoped the buyers would not accept this as a principle that was to be allowed to be set up. They must teach without wearying until they had impressed the authorities with the fact that they would not accept anything that might happen to be sent to them as gas coal. Even anthracite coal had been sent to gas-works; and yet gas engineers were requested to be willing to accept anything dubbed "coal." When they bought coal for making the nation's gas, they required to have sent them coal which the nation had and which should make the nation's gas. They should on every occasion, quite respectfully, and with due regard to the position at the time, say that they required suitable coals when they ordered them and were asked to pay for them.

Mr. Vincent Hughes (Smethwick) remarked that, as the one who was responsible for raising this question at the previous meeting, he was pleased to be able to bear testimony to the fact that the steps taken had induced those in authority to try to help not only himself, but many other gas undertakings. He could not altogether compliment the authorities on what they had done for them; but, at any rate, they had sent them something which was called coal. It was dubbed "loco. coal;" but it was a surprise to him how the locos. ever raised steam with such material. He was quite sure that every gas engineer would do his utmost to use such material as might be sent him; but really it was quite impossible to make gas out of some of the stuff they were receiving. He thanked the Coal Controller for his efforts to assist Smethwick. Supplies had been better so far as bulk was concerned; but the quality was very inferior. The gas coal was being sent to people for domestic purposes; and they did not know how to use it in an ordinary grate. The household coal was equally useless in a gas-works.

Mr. W. G. S. Cranmer (Willenhall) said he had been sent a little over 25 p.ct. of steam coal and 25 p.ct. of house coal. A friend of his had told him that when he was in London a short time ago the coal which had been sent to the place where he was as house coal must have been some of the best gas coal. They could hardly deal with it at all on the fire. This was simply an illustration of the inefficiency either of the Local Coal Committees or the Coal Controller. At the time the Local Committee allocated the coal, he had practically closed-up a contract for nuts; and during the month that was taken as a basis, they only had one truck of these nuts. Therefore they were allocated one truck of North Staffordshire nuts; and they had one truck from another place. But it did not come, as it was so small a matter that the people did not trouble about it.

Mr. Carder said they had heard a lot of criticism about all sorts of things; but he wanted to express two appreciations very heartily—one appreciation of what the Association had done in bringing this subject so prominently before the coal authorities, and the other a very sincere appreciation of the Coal Controller's attitude in the matter. They had not only sent him the quantity, but they had sent him the quality.

The President: It shows that the only thing to do is to keep jogging away at them. It does do some good in the end.

Société Technique Transactions.—A copy is to hand of the official report of the proceedings of the Société Technique de l'Industrie du Gaz en France, at the congress held last July at Metz and Strasburg. The meeting was under the presidency of M. Francis Rouland, the Director-General of the Société du Gaz of Paris; and special interest attaches to it from the fact that it was the first to be held on any considerable scale since the beginning of the war in 1914. A report of the proceedings, together with translations of some of the papers submitted, appeared in the "Journal" at the time.

AMMONIA AND COAL-TAR PRODUCTS IN ITALY.

Effect of the War.

Prior to the war Italy was largely dependent upon Germany for many chemical products; and after 1914 there was therefore a serious shortage, to overcome which means had to be sought. A permanent committee for the chemical industry was appointed in 1916; and their first report contains many figures indicating progress.

Owing to the pressing need for nitrate of ammonia for the manufacture of explosives, special attention was devoted by Italy during the war to increasing the production of ammonia and to the utilization, for this purpose, of ammoniacal liquors resulting from the manufacture of gas and coke. The production of nitrate of ammonia, insignificant before the war, reached 655 tons per month in 1918, while that of sulphate of ammonia, which equalled 14,323 tons in 1914, was 39,600 tons in 1918. Imports of the latter commodity, which were 21,668 tons in 1913, were reduced to 2464 tons in 1918.

The serious shortage of coal (imports during the war having been reduced nearly 50 p.ct.) interfered greatly with the operations of the gas plants. In 1918, 67 gas plants were shut-down on this account, and many others were obliged to employ wood, lignite, and other fuels badly adapted for carbonization. The monthly output of coal-tar in 1918 was 4139 tons. Before the war there was not a single gas plant in Italy provided with equipment for the recovery of crude benzol. However, by 1918 a production of 382 tons per month had been attained, all of which was concentrated under the direction of the military authorities for the separation of the benzol, toluol, and xylol.

The production of coal-tar oils showed a decrease in the case of light oils, and remained stationary in the case of medium and heavy oils. In order to meet the demands of the war, imports of benzol, toluol, and xylol, which amounted to 512 tons in 1914, reached 4675 tons in 1918. In the case of naphthalene, the 348 tons produced in 1914 yielded a small surplus over consumption for export. Though production had increased in 1918 to about 732 tons, this quantity was quite insufficient, and in that year imports reached 3218 tons.

Neither aniline nor any derivative was manufactured in Italy before the war. Imports of aniline and its salts amounted to 612 tons in 1913, and 532 tons in 1914. The manufacture of these products has now been undertaken in Italy on a small scale, yielding in 1918 1080 tons of aniline, 180 tons of hydrochlorate of aniline, and 36 tons of paranitraniline. The existing plants would be capable of doubling these quantities. In 1918, imports had fallen to 174 tons.

Water in Tar.

The arrangements adopted in some French gas-works to keep the water content of tar down to the legal standard of 4 p.ct. are described in a brief note in the "Chemical Trade Journal." The amount of water in crude tar sometimes amounts to 15 and even 30 p.ct.; and it is found that, even on standing, the water does not readily separate from the tar—particularly when the aqueous liquid is ammoniacal liquor. In consequence, arrangements were made to avoid such emulsions of tar and ammoniacal liquor by feeding the hydraulic main with fresh water instead of liquor—using 30 litres of water per 100 c.m. of gas (1·86 gallons per 1000 c.ft.). Thus the ammoniacal liquor decreased in strength; but former losses of ammonia, which were experienced through the repeated heating of liquor in the hydraulic main, were considerably curtailed. The seal-pots, which tend to promote the formation of an emulsion of tar and ammoniacal liquor, are another source of trouble. The usual type of seal-pot was consequently altered—the new form constituting an enclosed square tank, in which the tar coming from the retort-house runs down an incline, while the liquid accumulating at the bottom forms a seal on the take-off pipe. This arrangement assists greatly in the separation of tar and water, inasmuch as the globules of water contained in the tar are absorbed by the supernatant water above the tar at the bottom of the tank. Similar arrangements were made for the montejus, by means of which tar is handled on the works, and also for the tar-liquor separators.

A "Manual of Gas Distribution."—Mr. Walton Forstall, Engineer of Distribution to the Philadelphia Gas-Works, has edited a "Manual of Gas Distribution," which will be reviewed in our pages at an early date. It is an extensive book, running to nearly 1000 pages (with some 300 illustrations), published by the U.G.I. Contracting Company of Philadelphia. More than twenty years ago, Mr. Forstall accepted an invitation to aid in the organization of a distribution department for the Philadelphia Gas-Works; and in 1905 he began—at first with only local use in mind—to plan a book which primarily would teach beginners, in great detail, the principles of gas distribution, but which would also be of some value to the adept. As it was intended for use there, it treats of Philadelphian conditions only. Hitherto, it seems, works on distribution have been available in English from British sources only; and the usefulness of these is felt to have been limited through the considerable difference in practice, in tools, and in material obtaining in the two countries.

MIDLAND JUNIOR GAS ASSOCIATION.

A Meeting of the Midland Junior Gas Association was held on Thursday last, at the Birmingham Council House—Mr. CARRINGTON BARBER (the President) presiding.

Mr. R. J. ROGERS opened a discussion on the subject of

MAINTENANCE.

Are gas appliances kept in an efficient condition when installed on a consumer's premises? Before we can consider the *pros* and *cons* of maintenance, we must feel satisfied as to whether gas appliances really need maintenance attention. Very few gas engineers will disagree with the statement that, generally speaking, gas appliances are not efficiently maintained by the consumer himself; and they will also agree that they do indeed need attention from some person properly trained to deal with them.

Considering the great amount of attention which is paid to a prospective purchaser with a view to obtaining an order for gas appliances to be installed, and the measures which are taken by various gas undertakings to ensure that such appliances are properly fitted, it is remarkable that, as a rule, gas apparatus is more or less neglected after it has once been fitted upon the premises of the consumer. It will be generally agreed that we cannot obtain the permanent goodwill of the consumer, nor increased output of gas, unless the various gas appliances are giving him satisfaction. In order to secure this, appliances must be properly and periodically maintained. I think there will be very few who will not agree that it is to the benefit of the industry that the maintenance of appliances should be undertaken. The chief point which we have to consider at the moment is the manner in which the maintenance of various types of gas apparatus shall be carried out, and the financial aspect with regard to it.

For many years past gas undertakings in this country have had in operation various systems of maintenance, especially in connection with incandescent gas-burners. For this service a charge has usually been made, either for labour only for periodically cleaning and adjusting burners, or an inclusive charge has been made which includes the cost of mantles, chimneys, and rods. Usually the charges have been based on a figure on which a profit was not intended to be made. In fact, with many undertakings this maintenance business of lighting burners was carried out for consumers at less than cost price; the main idea being to insure that a satisfactory light was obtained from the burner.

In reviewing this question of maintenance after the war period, we are faced with circumstances very diverse from those which we had to consider in pre-war days in designing maintenance systems for various types of appliances. Wages and materials, the two main items to be considered in this matter, have increased enormously. The altered condition in relation to the finances of many gas undertakings, particularly companies working under a sliding-scale, is a big factor to be taken into account in connection with the question of maintenance. The school of thought on this subject in the industry can, roughly speaking, be divided into two groups—namely: (1) Those who consider that free maintenance should be undertaken by the gas authority and the cost arranged for in deciding upon the price of gas per 1000 c.ft. to be charged to the consumer; and (2) those who consider that maintenance of appliances should be charged for independently of the price per 1000 c.ft. at which the gas is sold and in proportion to the maintenance work undertaken for each individual consumer.

While from an efficiency point of view we should prefer that all gas appliances should be maintained in an efficient condition for every consumer, there would arise some very unfair anomalies if the general charge for maintenance was to fall upon consumers in the form of an increase in the price of gas per 1000 c.ft. In view of existing conditions in the industry, I am personally of opinion that gas should be manufactured and sold as cheaply as possible, consistent with giving the consumer the quality which is best suited to his needs. If gas is to be the universal fuel of the future, and is to replace solid fuel, we must undoubtedly be able to reduce the cost per 1000 c.ft. Although I am an ardent believer in the necessity of maintaining the efficiency of consumers' appliances I do not think we should, under existing conditions, be justified in saddling all maintenance costs on the charge per 1000 c.ft., as has been advocated by several persons.

If it is agreed that consumers should pay for maintenance separately from the charge for gas consumed, the question arises as to the particular charge we should make for maintenance service rendered. In Birmingham in pre-war days, in common with many other gas undertakings, we made a charge for burner maintenance on a scale which was based on the number of burners on a premises, irrespective of the type of premises in which the burners were fitted. This scale was as follows:

Up to 11 burners . .	3d. per burner per quarter, with a minimum charge of 1s. per quarter.
12 to 15 burners . . .	3s. per quarter.
16 to 20 ,, . . .	3s. 6d.
21 to 25 ,, . . .	4s. 2d.

A special quotation was made for more than 25 burners, usually at the rate of 1½d. per burner per quarter. These prices were net. All materials, such as mantles, chimneys, and other accessories were charged for as used at current rates.

NEW SCALES OF CHARGES.

When considering a short time ago the new scale of charges to consumers for the maintenance of incandescent burners, we made a careful analysis of the profit or loss in the maintenance of burners in various types of premises, such as private houses, shops, hotels, churches and chapels, factories, public institutions, &c. We analyzed very carefully the various labour charges in connection with the work carried out in the different premises, and also ascertained the proportion of profit made in supplying mantles, glass, and replacement parts in the same premises. We found that both labour and material varied fairly considerably in the different buildings; and in consequence of this investigation, the following scale of charges has been adopted by the Birmingham Gas Department for mantle maintenance work:

Class.	Description of Premises.	Number of Visits Given by Attendants Each Quarter.	Charges per Burner per Quarter Net.
	Low-Pressure Burners.		
A	Private houses	Two	4d.
B	Shops and hotels (interior) . . .	Two	4d.
C	,, ,, (exterior) . . .	Three	7d.
D	Churches and chapels, &c. . . .	Two	6d.
E	Factories	Three	8d.
F	Public institutions	Six	9d.
	High-Pressure Burners.		
G	Interior of premises, burners up to 500 c.p.	Three	9d.
H	Interior of premises, burners from 500 c.p. up to 1000 c.p. . . .	Three	1s.
I	Exterior of premises, any burner to 1000 c.p.	Three	1s.

It will be noticed that the number of visits to be paid by the attendants each quarter varies. This number of visits was determined on the experience we had gained as to the amount of periodical attention which should be given to burners in the different buildings. This new scale has been in operation for some months, and is working very satisfactorily. Personally, I think it will give greater efficiency in maintenance, and is a more equitable way of charging for services rendered.

If we are to retain gas lighting in competition with electric lighting, we must maintain the burners as efficiently as possible; and it should be the aim of all district inspectors and salesmen coming in contact with the public to induce them to have their burners periodically maintained by trained burner cleaners. I trust the members of the Association will discuss this point, and let us have their views on the subject.

FITTINGS MAINTENANCE.

With regard to the maintenance of gas-fittings supplied by gas undertakings to automatic meter consumers, the usual practice is to maintain the various lighting fittings, such as pendants, brackets, &c. The cost of the work amounts to a considerable sum in large gas undertakings. By careful observation, it has been found that the chief items of cost in the maintenance of such fittings has been in the repair of the taps and swivels, due in many cases to the quality of the fittings in use. It has been clearly demonstrated that the fittings which are cheapest in first cost prove the most expensive in the long run, when all charges are taken into account. This points to the desirability of adopting strong and durable fittings for slot installations, which have to be under the perpetual maintenance of the gas supply authorities. This is a point that should be seriously considered when deciding on the fittings to be adopted in new housing schemes.

GAS FIRES AND COOKERS.

With regard to the maintenance of gas fires and cookers on hire, it has been the practice in Birmingham, when such appliances have been supplied on simple hire, to maintain them free of charge to the consumers. The cost of this work has been taken into account in determining the hire charge to the consumer for such appliances. Unlike incandescent burners, gas fires and cookers require much less frequent attention. Our practice has been to periodically inspect gas-fires at intervals of about twelve months, when the maintenance attendant calls and thoroughly overhauls and cleans the stove, adjusts the burners, and renews any fuel required. On the request of any consumer between the regular visits of the maintenance attendant, we willingly send to attend to any complaints.

Standardization of parts is an important item in the maintenance of gas appliances. From the commencement of our hiring system, while having a large selection of designs in appliances, we have insisted, both in our cooking stoves and gas-fires, on all makers supplying replacement parts of standardized design. These include the chief items of maintenance, such as burners, deflectors, top bars, &c., in cooking stoves, and fuel, fuel supports, &c., in gas-fires. This procedure has resulted in economy in maintenance which has amply justified the adoption of standardized parts.

At the present time we have in use in Birmingham more than 130,000 gas-cookers and over 31,000 gas-fires of standardized design, in so far as maintenance of wearing parts is concerned. We have a card system for the maintenance of such appliances; each apparatus being recorded on a separate card. We are, therefore, able to tell on reference immediately the number of visits paid by a fitter, the time taken by him on the job, and the replacement parts supplied to any particular apparatus. This

has been found particularly useful in connection with the maintenance of gas-cooker parts, such as oven and grill tins, &c. We frequently receive applications for new tins from consumers, and on reference to the card find that tins have been provided very recently. If new tins have been supplied to the consumer within a period of twelve months, we do not issue another tin, as we consider twelve months a reasonable period for the life of such utensils.

In years past we found that consumers, when moving from one address to another, frequently took away with them the tins and grids from hired gas-cookers. The new tenant would make application for new tins, &c., stating that the cooker had no tins. In such cases we referred to the maintenance card, and found that new tins had been supplied to the late tenant at a recent date. We then traced, if possible, the new address to which the tenant had removed, and (if within our area of supply) insisted on the tins being returned to the cooker at the old address. When it became known that the Gas Department traced the old tenants to recover tins, &c., the practice of taking away new tins by departing tenants soon ceased, and resulted in a diminution of cooker maintenance charges.

WATER HEATING APPLIANCES.

With the increasing use of gas water-heating appliances, such as circulators and geysers, the maintenance of them had to be seriously considered. In order to obtain the best results, periodical maintenance must be undertaken. The frequency of the visits depends very largely on the effect of different qualities of water on the boiler itself, whereas in some districts, with certain types of circulators, a visit has to be paid every six months, in other areas a twelve monthly inspection and cleaning is all that is necessary. The water-heating field is a large one; and due regard must be paid to the maintenance of water-heating appliances if we are to obtain the maximum amount of business in this direction.

CONSUMERS' OWN APPLIANCES.

With regard to the maintenance of consumers' own appliances (other than those on hire from a gas undertaking), it is equally important that these should be maintained in an efficient condition. Appliances installed in canteens and kitchens in large establishments call for special attention; and we are considering in Birmingham a scheme for the inspection and maintenance of such appliances.

Discussion.

A hearty vote of thanks was passed to Mr. Rogers, on the motion of the PRESIDENT, seconded by Mr. H. CLARK (Derby), who stated that in his town maintenance was a difficult question, and that waiting for cooker parts often meant a dissatisfied consumer.

Mr. B. J. BELL (Birmingham) commented on the importance of the subject, especially having regard to present high charges. Consumers needed to be better instructed as to maintenance; for many of the defects occurring in equipment and in mantles were due to ignorance on their part as to what should be done or to indifference. Nevertheless, the general tendency was to blame the gas undertaking. The circumstances demanded that the financial aspects of maintenance, from the point of view of the obligations of the public, should again come under review. There was nothing to justify free services. It was impossible to prevail on the majority of people to pay the necessary amount of money for the maintenance of any apparatus. They looked to the gas undertaking to make all repairs as if it were a kind of philanthropic institution. He strongly felt that all services rendered should be charged for.

Mr. R. G. MARSH (Birmingham) said there was no doubt the apparatus that gave the most trouble on the maintenance side was the incandescent lighting burner. The average consumer was either unwilling or unable to maintain efficiently his own burner. He considered it was up to them to maintain the burners in the best possible condition, in order to compete with the electric light. As to the financial aspects, it had been suggested that either the cost of gas should be increased or a charge made on each individual consumer for maintenance. Surely a scheme might be formulated, based upon experience, by which a varying rate for gas could be charged to different classes of customers. He believed the results would be justified, notwithstanding the extra work that would be involved on the accountancy side. Apart from lighting, other apparatus was not costly on the maintenance side. Generally one visit per annum in respect of a gas-fire was adequate.

Mr. SIMMONDS (Dudley) pointed to the large amount of gas used by gas-engines, and inquired whether a maintenance section might not with advantage be created in respect of these. He was formerly connected with an undertaking which made a charge for labour in connection with burners, if the work involved occupied more than one hour—in addition, of course, to the charge for material. It paid an undertaking to make an extra visit to large factories; but if other visits were necessary beside the periodical inspections, then the consumer was charged for the operatives' time. The importance of standardized fittings lay in the fact that workmen could be easily trained. Where the fittings were of a varying character, the amount of labour in the stores and in making the inspections was greatly increased. As to radiators, frequently no attention was paid to them. He suggested that the price charged should be such as would provide for the cost of making the necessary periodical visits. Regarding water heating, he pointed out that one concern with which he was connected had a hire-purchase scheme, and in it was included maintenance. A card system, with various coloured cards for the different classes of work, greatly simplified administration. In regard to high-pressure work (outside burners), maintenance was frequently very heavy. This was largely due to incompetence on the part of the consumer; and in relation to this class of work, and also that of lighting churches and public buildings as well as radiators, it seemed advisable that special attention should be paid by the undertaking. The lighting and other facilities in such places might easily serve as an effective (or bad) advertisement for the supplying company or undertaking. All domestic lighting fittings should be, he thought, of drawn tubes.

Mr. G. M. LEWIS (Birmingham) emphasized the importance of having good burners and fittings—the latter standardized. In regard to domestic fittings, he would abolish, were he able, the swivel at the ceiling. Pendants should be fitted with ball-joints, and water-slides discouraged. The Birmingham Gas Department recognized the great advantage of having standardized fittings. The maintenance charges in connection with automatic apparatus were small. Tubes should be solid drawn, or of not less than No. 19 gauge. With this provision, tubes seldom split. As to bye-pass tubes, trouble might be avoided by fitting them some distance from the mantle, and not in a direct flow line with the products of combustion. Brackets should be of No. 19 gauge tube, with a fairly large tap. Burners might with advantage be standardized on one pattern, to which could be affixed nozzles of any size. A one-pattern fuel for fires was the more economical. With regard to wash-boilers, much trouble was avoided by the use of copper pans—heavier than the standard pattern. Geysers should be fixed with safety valves. He considered that any complaint of unsatisfactory fittings or bad lighting should be inspected by the department's inspectors, and no charge made for inspection if new material were not required.

Mr. LUKE STURDY (Birmingham) said there was objection to a general rate being levied for maintenance. Men would not pay if individual service was not rendered. The standardization of gas-burners was very necessary.

Mr. A. WHITEHEAD (Birmingham) favoured a nominal charge being made to the consumer for maintenance. Much of the trouble was due to cheap burners. Departmental staffs might with advantage advise the use of the best quality material. Another frequent cause of complaint was due either to the uncleanliness of the supply pipe or that it was inadequate to the demands made upon it. The latter was being rectified in new installations; but it explained why some consumers gave up gas in favour of electricity.

Mr. W. BATT (Birmingham) urged the need for the adoption of more maintenance in relation to apparatus used for the supply of gas for industrial purposes. When gas-fires sold on the high-purchase system were paid for at the end of three years, maintenance was discontinued. He did not regard this as a wise policy. Periodical inspection would, in his opinion, be well justified.

Mr. W. E. CADWALLADER (Birmingham) expressed the need for more highly skilled and scientifically-trained men. It was important that those entrusted with repair work of domestic gas-fires should be of good address—preferably, they should be in uniform. Maintenance work should be continued in the summer so as to prevent the possibility of congestion of work during the winter period. Otherwise, seasonal men only would be required. This should be avoided whenever possible.

Mr. ROGERS, in reply, agreed that more educative work was necessary so far as the consumers were concerned. A charge for maintenance should be made sufficient to cover the cost of labour. The cost of maintenance was obviously lowered as the use of gas-fires increased; for it meant that to a great extent maintenance work could be done on the house-to-house principle. The question of making a charge must be considered, having regard to the generally increased administrative charges. As to the suggestion that varying charges should be made, so as to cover maintenance costs, he was afraid it would not be possible to get consumers to agree to such a system. He preferred that payment should be on the basis of actual work done. Steps were being taken in Birmingham to schedule prices for canteen appliances.

PEOPLE'S GAS LIGHT COMPANY OF CHICAGO.

It has been announced by the Chairman that, instead of relying upon the more or less uncertain outcome of an appeal to the Rate Commission for increased revenues, and to avoid the disturbing effect upon the community, the People's Gas Company of Chicago are to endeavour to effect economies in manufacture which will tend to relieve the present situation. Plans have been completed whereby the Company will not only be enabled to cut-down the cost of production, but to improve the financial position. It is anticipated that the arrangement, which entails the formation of an allied Company and the erection of two large plants, will save the Company directly $1,000,000 a year; and the Chairman declared that the plan will give the Company (at the end of not longer than eighteen years) two gas plants to be erected, within the course of the next two years, at an initial cost of $18,000,000. The scheme consists of an arrangement with the Koppers Company, of Pittsburgh, to erect two plants on ground purchased from the People's Gas Company for $600,000. When the plants are completed, they will be handed over to, and operated by, a newly-formed undertaking to be named the Chicago Bye-Products Coke Company. The capital stock will really be in the hands of the Koppers Company. It is anticipated that the cost of gas production will be so low that a sinking fund will be created to redeem bonds which will be issued to meet construction charges. The People's Gas Company will guarantee both interest and principal of the bonds held by the Koppers Company; and in return for this, and the profit they make during the years of their operation of the plants, the Koppers Company will surrender their holdings of stocks and bonds when the sinking fund of the Chicago Bye-Products Coke Company is large enough to redeem them, in their entirety or else serially. The American Coke and Chemical Company are also about to put up a bye-product coke-oven plant entirely independent of the new Koppers plants just referred to; and the Company intimate that they will offer the gas at a price that will compel the attention of the People's Gas Company.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Meeting in Bradford.

A Meeting of the Yorkshire Junior Gas Association was held on Saturday afternoon, at the Bradford Gas Department Show-Rooms, under the presidency of Mr. J. M'Lusky, of Halifax.

Mr. E. L. Oughton (Milnebridge, Huddersfield), presented the following paper entitled

"RANDOM NOTES, MAINLY ABOUT HOUSING SCHEMES."

The object of this short paper is to raise discussion upon a subject much written about in the technical and lay press—the position of gas in the many new housing schemes.

Can the advocacy of gas for lighting, cooking, and heating be consistently pursued from an economic and physiological standpoint? These are important questions; for the one touches the pocket, and the other the health. The gas industry without lighting is unthinkable; and if ever lighting is subject to a "mutually arranged separation"—let alone the thought in some minds of "divorcing" this section—it will be a sorry day for gas. An electrical journal stated in March this year: "But lighting is the thin end of a very big wedge, to be inserted at all costs. Lighting is the advance guard; the other uses follow." Very few believe that electricity is a formidable rival in cooking and heating for domestic purposes; while those who do believe it are generally disillusioned sooner or later—unless the economic side has not to be considered. Yet there is sometimes a weakening among gas officials when lighting is under consideration. What is the real position?

Cost of Installing Gas.

Modern houses—such as are being erected under the new housing schemes—may be carcassed to an approved specification and fitted-up with one 2-light fancy pendant, ¾ in. stem, with high-class burners for the best room, one ½ in. light fancy inverted pendant and burner for the living-room, and ⅜ in. plain 1-light inverted pendants in each bedroom, bathroom, lobby, scullery, &c., with burners (no glassware included), together with connections for a cooker, boiler, and gas-fires, for approximately £1 per point.

Cost of Electric Wiring and Fittings.

The lowest tender known to the writer is 25s. per point, exclusive of fancy 2-light fitting, and only flexible wire drops for the others. The average figure generally runs between 30s. and 40s. per point.

Cost of Gas and Electricity for Lighting.

A very recent electrical advertisement appeared in the daily press stating that "an 8 c.p. electric lamp gives 20 hours light for a penny," and claimed this was cheaper than "the match you light your gas with." Of course, they ignored the actual comparative costs of gas and electric lighting. One cannot help contrasting the sound technical and scientific propaganda of the "B.C.G.A." with such "drivel."

Relative Costs for a 16 c.p. Light.

Gas at 20 c.p. per c.ft. Electricity at 1·25 and 17 watts per c.p.
16 c.p. in both cases.

Gas.		Electricity.		
Cost per 1000 C.Ft.	Hours of Light for 1d.	Cost per B. of T. Unit.	Hours of Light for 1d.	
			7 Watts per C.P.	1·25 Watts per C.P.
s. d.		d.		
3 0	34·6	3	29·7	16·6
3 2	32·8	4	22·3	12·5
3 4	31·2	5	17·8	10·0
3 6	29·5	5½	16·2	9·0
3 9	27·5	6	14·8	8·3
4 0	26·0	6½	13 7	7·7
4 2	25·0	7	12·7	7·1
4 5	23·5	7½	11·9	6·6
4 8	22·2	8	11·1	6·2
4 11	21·1	8½	10·5	5·9

No allowance made for renewals.

The beneficial effect of the low intrinsic brilliancy of the incandescent gas mantle is too well-known to need demonstration or further proof. Leading scientific and medical men have already done this, and also shown the great advantages accruing from the promotion of air currents set-up by gas burning in a room as an aid to ventilation.

The following figures show a phase in which gas lighting is a distinct gain, particularly in working-class houses—viz., as an auxiliary means of heating the room. This is specially advantageous on the cool evenings of late spring and early autumn, when fires have not been needed all through the day. In winter, the heat given off maintains the room at a higher temperature, while on hot summer nights the gas burning materially helps to create increased air movement, owing to windows being open.

For an example, take a room 15 ft. by 12 ft. by 9 ft. This has a cubic capacity of 1620 c.ft. The light for this room would be a 90 c.p. burner consuming 4·5 c.ft. per hour. [Figures are also given for 50, 30, and 16 c.p. lights, and for electric lamps of equal candle power.]

Data used: Temperature rise × cubic content of room × 3 air changes per hour × 0·02 + 25 p.ct. heat and ventilation losses.

It is found that 32·4 B.Th.U. are needed to raise the temperature of this room through 1° Fahr. [0·02 B.Th.U. to raise the temperature of 1 c.ft. of air 1° Fahr.]

Temperature raised per hour by various lamps:

C.P.	°F.	C.P.	°F.	C.P.	°F.	C.P.	°F.
90 (gas-burner)	17·0	50 (gas)	9·4	30 (gas)	5·6	16 (gas)	2·8
90 (1·25 watts E)	3·2	50 (E)	1·7	30 (E)	1·06	16 (E)	0·57
90 (0·7 watt E)	1·8	50 (E)	1·0	30 (E)	0·6	16 (E)	0·32

Gas-burners, c.ft. per hour × cal. value.
Electric lamps, c.p. × watts per c.p. × 3·44.

Lighting Efficiencies with Various Candle Power Burners.

To obtain the best results, it is advisable to have the light so shaded that the rays fall about 3 ft. from the floor at a distance of 2 ft. from the walls. This allows for persons sitting round the room to read with comfort.

For example, take the room beforementioned, 15 ft. by 12 ft. by 9 ft., with a 90 c.p. I-light pendant fixed in the centre of the room 3 ft. from ceiling to centre of mantle. We should obtain the following readings in foot-candles:

(A) Directly underneath light on a table 2 ft. 6 in. from the floor,

Ill. (foot-candles) $= \frac{c.p.}{d^2}$ for normal plane readings.

90 c.p. lamp $= \frac{90}{(3·5)^2} = \frac{90}{12·25} = 7·3$ foot-candles.

50 c.p. lamp $= \frac{50}{(3·5)^2} = \frac{50}{12·25} = 4·08$,,

(B) 3 ft. from floor and 2 ft. from the wall on shorter side,

90 c.p. lamp $= \frac{90}{5^2} = \frac{90}{25} = 3·6$ foot-candles.

50 c.p. lamp $= \frac{50}{5^2} = \frac{50}{25} = 2·0$,,

(C) 3 ft. from the floor and 2 ft. from the wall on longer side,

90 c.p. lamp $= \frac{90}{(6·3)^2} = \frac{90}{39·25} = 2·3$ foot-candles.

50 c.p. lamp $= \frac{50}{(6·3)^2} = \frac{50}{39·25} = 1·2$,,

To obtain reading in position B and C on the horizontal plane, multiply the above results by the cosine of the angle of incidence. [A book laid on the knees would be in the horizontal plane.]

Lighting authorities specify 1·5 foot-candles (F) for sitting rooms, and 4 foot-candles (F) for a dining table.

The colour of globes and wallpapers greatly affects lighting efficiencies.

Gas, Electric, and Coal Fires.

A gas-fire of 70 p.ct. efficiency, consuming 25 c.ft. of gas per hour (450 calorific value net), will utilize as heat to the room $25 \times 450 \times 70 \div 100 = 7875$ B.Th.U. per hour.

An electric fire of 90 p.ct. efficiency, taking 3440 B.Th.U. per B. of T. unit (7875 B.Th.U. per hour) needs $\frac{7875}{3440} = 2·28$ B. of T. units at 100 p.ct. efficiency. Therefore, at 90 p.ct. efficiency, it will need 2·53 B. of T. units. As a comparison with a 25 c.ft. per hour gas-fire, this would need, to give the same heat, ten 250-watt glow-lamp heating tubes 11·25 in. high and 4 ft. wide overall. This type of heater still figures largely in electrical catalogues, though the "heating element" type of fire is probably more in use now, and brings the size nearer to that of a modern gas-fire, but does not bring the cost of heating per hour any cheaper. A coal-fire of 20 p.ct. efficiency will use about 3 lbs. of coal (13,000 B.Th.U. per lb.) per hour to utilize 7800 B.Th.U. per hour as heat to the room. This is an average fire of modern type; the grates varying from 2 to 5 lbs. of coal per hour.

Note: One B.Th.U. is as good as another, though some gas will yield 350 and others 500 to the cubic foot.

Electricity gives 3440 B.Th.U. per B. of T. unit.

Coal will give 11,000 to 14,000 per lb.

But each B.Th.U., whatever its source, is obviously as good as the other.

Relative Costs of Gas, Electric, and Coal Fires.

Gas-fires—

Gas, 450 B.Th.U. net, calorific value, 25 c.ft. per hour.
70 p.ct. efficiency. 7875 B.Th.U. utilized per hour.

Cost per 1000 c.ft.

3s.	3s. 2d.	3s. 4d.	3s. 6d.	3s. 9d.	4s.	4s. 2d.	4s. 5d.	4s. 8d.	4s. 11d.

Cost per Hour.

0·9d.	0·95d.	1d.	1·05d.	1·1d.	1·2d.	1·25d.	1·3d.	1·4d.	1·47d.

Electric fires—

Electricity, 3440 B.Th.U. per B. of T. unit.
Fire rated 2·5 B. of T. units per hour. 90 p.ct. efficiency = 7740 B.Th.U. utilized per hour.

Cost per B. of T. unit.

½d.	1d.	1½d.	2d.	2½d.	3d.	3½d.	4d.	4½d.	5d.

Cost per Hour.

1·25d.	2·5d.	3·75d.	5d.	6·25d.	7·5d.	8·75d.	10d.	11·25d.	12·5d.

Coal fires—

Coal, 13,000 B.Th.U. per lb., 20 p.ct. efficiency.
3 lbs. per hour, 7800 B.Th.U. per hour utilized.
[Costs are also given for fires using 4 to 5 lbs. of coal per hour.]

	Cost per Ton.						
	26s.	27s.	28s.	29s.	30s.	31s.	32s.	33s.
	Cost per Hour.						
(31b)	0·417d.	0·432d.	0·450d.	0·465d.	0·480d.	0·498d.	0·513d.	0·528d.
	34s.	35s.						
	0·546d.	0·561d.						
	Cost per Ton.						
	26s.	27s.	28s.	29s.	30s.	31s.	32s.	33s.
	Cost per Hour.						
(41b)	0·556d.	0·576d.	0·600d.	0·620d.	0·640d.	0·664d.	0·684d.	0·704d.
	34s.	35s.						
	0·728d.	0·748d.						
	Cost per Ton.						
	26s.	27s.	28s.	29s.	30s.	31s.	32s.	33s.
	Cost per Hour.						
(51b)	0·695d.	0·720d.	0·750d.	0·775d.	0·800d.	0·830d.	0·855d.	0·880d.
	34s.	35s.						
	0·910d.	0·935d.						

[Nothing allowed for carting costs or wood for kindling.]

These figures do not need much explanation. It is well, however, to remark that they are for hourly consumption. In the case of coal, the difference in cost is turned in favour of gas (electricity cannot be considered) where the heat is needed intermittently, as there are periods when the gas is shut off, while the coal consumption is continuous.

These comparisons do not relate to a living room fire which has a back boiler fixed for heating the supply of domestic hot water.

Gas-Fires.—The "B.C.G.A." are rightly bringing before architects and building authorities the economic advantages of gas-fire flues being built into the walls of new buildings. It may or may not be generally known that in many parts of Yorkshire houses are built of stone, with a cavity between the inner and outer wall. This has been utilized by architects for many years. The cavity is walled-up on either side for 3 or 4 feet, and the gas-fire fixed with the flue direct into the cavity. In this manner gas-fires have been installed where it would have been impossible to build a coal-fire flue. Of course, in brick-built houses the hollow concrete block is essential.

Gas-Cookers.—The question of the gas-cooker is very complex compared with the gas-fire. A standard cooker for the British Isles, for example, is almost an impossible proposition, owing to the very diverse methods of preparing food and the greater diversity of foods cooked. This will at once appeal to those who have lived in various parts of the country and are not parochial in their view of things. The people of the more Southern Counties could not live on the food of their hardier kinsmen further North, and *vice versâ*. The gas-cooker in the North is part and parcel of the housewife's very existence; while further South less cooking and baking are done at home, with the result that the gas-oven is used only two or three times a week. Then, where no baking is done at home it is possible that an unpacked cooker will meet the case, with the additional virtue (or vice) of heating the kitchen, though it is not the essence of economy to heat a room with an 11 p.ct. efficiency cooker. Whatever the desires of the public are—and they surely should be considered, since they pay—can be met in the varied types now on the market. There is the orthodox open-flame oven, which, though old, may outlive the semi-closed and even the totally sealed type of gas oven, where the best-cooked and the best-tasting meat is demanded. The bogie of "loss of weight" in cooking, &c., has been effectively disposed of, to the utter discomfiture of the electrical people, who have said so much in advertisements relating to the assumed—it should be presumed—superiority of electrical cooking appliances.

Gas Washing-Boilers.—It is well to remember that the capacities of these boilers are taken as a rule when filled with water to the brim. Therefore one cannot boil 10 gallons of water in a 10-gallon pan, because, in raising the temperature from 40° to 212° Fahr., there is an expansion of 1-25th, or 4 p.ct. in volume; and 3·2 pints would overflow without allowing for any loss due to ebullition. Regarding costs of boilers, it is advantageous if cast-cased boilers with rustless pans are installed in new houses. The initial cost is higher; but the life is much longer, and maintenance charges very low—almost *nil* for seven or more years. Some recent tests taken *in situ* gave an average consumption of 6 c.ft. per gallon of water boiled.

Gas Water-Heaters for Domestic Supplies.—In the better-class type of new houses being erected, there is much scope for gas water-heaters; and every effort should be put forward to ensure their adoption. In existing houses, the gas circulator is generally advocated as an auxiliary to the coal-fire back boiler system of hot water supply. Ought we not to reverse the order in new houses, and have the gas-circulator always directly connected to the storage cylinder, and the coal-fire-back boiler as the auxiliary? If this is done, it is possible to obtain the highest working efficiency from the gas-circulator. There are always heat units to spare in the coal-fire to compensate for heat loss between the fire and cylinder. Where there is to be an independent gas-heated hot water supply, various types of appliances are available—viz., the combined circulator cylinder, the circulator cylinder cistern, the califont type of pressure geysers, and others.

Standard cookers have been mentioned—in fact, standardization is very much in the air at present, and seems to be accompanied by a desire on the part of some firms to create a standard trust for the manufacture of gas appliances. Does it not savour of the same spirit which underlies nationalization? Is not healthy trade competition with its attendant tonic effects in danger of being eliminated, and stereotyped departmental rivalry substituted? Surely it behoves the younger men in the industry to look with a clear vision into these tendencies. The beginnings are already seen; but what of the end?

Supply of Gas to New Housing Schemes.

This is a very important matter, and needs careful thought, because, if the "nearly all gas house" is an actuality, it behoves the gas undertaking to guarantee a constant and sufficient supply. High-pressure steel boosting mains will solve the difficulty in probably the majority of cases; connections being made into existing low-pressure mains with governors at various points according to demand. Services and meters must be adequate for the maximum demand—a point often overlooked on the score of economy.

Fixing Appliances.

If the gas undertakings do not execute the work themselves, they should, in the interests of the consumers and themselves, exercise close supervision in the fixing of appliances, and see that suitable ones are supplied.

Maintenance of Gas Lighting and Appliances.

This is also very important; and one is pleased to see the tendency of gas undertakings to do this work upon systematic lines with trained men.

DISCUSSION.

The Chairman said they must compliment Mr. Oughton on the paper he had given at extremely short notice. Most of the facts and figures would be more readily assimilable when they appeared in the "Journal." Mr. Oughton had given the cost of gas installations in the new houses as £1 per point. He (the Chairman) had got out a rough estimate which indicated that to carcass an average house with gas-fittings would cost about £27. By this, he meant a house ready to put into use. Taking 5 p.ct. for interest and 5 p.ct. for maintenance per annum, that meant £2 14s. per annum in fixed charges for the house. Taking a gas consumption of 18,000 c.ft., the fixed charges worked out at 3s. per 1000 c.ft. He (Mr. M'Lusky) mentioned that he heard a rumour that the Ministry of Health did not propose paying the cost of carcassing a house. It stood to reason that at the figures he had quoted, they could not charge the gas at 3s. extra. The amount should be included in the charge for the house, because the gas-fittings were permanent—they were part of the house. Another point was the meter. He thought a meter nowadays cost about £4. This worked out at 8s. per annum for interest and maintenance—equal to 5·3d. per 1000 c.ft. If they took also a meter-reader making eight visits per annum, it cost about 1d. per 1000 c.ft. for meter-reading. The distribution costs nowadays were a very big item. In a Yorkshire town of which he knew, the average price received was 4s. 8d. per 1000 c.ft., interest and sinking fund charges on which were about 6d. The total cost of manufacture and distribution was about 3s. 2d., the works costing about 1s. 2d., and the distribution and establishment charges about 2s. per 1000 c.ft. Distribution was now costing more than, or at least equal to, manufacturing. The amount of business the gas industry would get from these housing schemes was problematical. He was afraid the Ministry of Health were rather unduly obsessed by the idea that electricity was the "coming thing" for all purposes, and were inclined to go in for electricity rather than gas. If so, it was up to the gas industry to show what gas could do.

Mr. A. E. Leask (Leeds) said the subject of the paper was quite up to date. They of the gas industry had to make out the best case they could for gas; and the paper had dealt considerably with the competition they had to face in electricity. Mr. Oughton need not be afraid of the free publicity of anything he had said, because it would all stand the test of the closest criticism. Electrical people would say the advantage of their light was that it was cool; while gas men said the advantage of gas was that it was warm. They did not clash with the electrical people on this score. It must be generally admitted that when light was used, it was generally in the evenings and more in winter than in summer. Therefore there was a clear case in recommending gas on account of its heating value, even though used for lighting. With regard to the competition between gas and electricity for heating, gas was a long way ahead. A certain Leeds authority had decided to instal either gas-fires or electric-heaters in fourteen houses; but a comparative test showed that the electric-heater cost 1s. per hour, while the gas-fire ran out at only 2d. per hour. Needless to say, the gas people got the order. What astonished him was that a responsible authority could possibly pass a resolution giving a choice between gas and electricity in heating for working-class dwellings. It was greatly to be regretted that in many cases the authorities had recommended electricity for lighting entirely, as it must be recognized that the present demand among working-class houses was for gas lighting. Electricity had had its opportunity, and the working people had not adopted it, largely on account of its expense. It was therefore clear that housing authorities were not doing the right thing if they excluded gas from the lighting of working-class dwellings.

Mr. Bateman (Wakefield), referring to the suggestion of utilizing the cavity between the inner and outer walls of the house for the passing of burnt gas from a gas-fire, asked would there not be considerable danger of the formation of an explosive mixture in the cavity if the fire was accidentally left on unlit? It might be a serious matter when a light was applied to the fire.

Mr. Oughton said the use of the cavity had been in practice in parts of Yorkshire for years past; and he had never heard of a mishap. The same thing, he suggested, would apply in any other circumstances if a gas appliance were left unlit.

Mr. Bateman said it seemed to him that there would be danger of "pockets" of gas forming in the cavities. Of course, something would depend on the design; but he felt that it would be extremely risky to

put waste gases into a cavity without thoroughly examining as to where the cavity led to.

Mr. C. ROPER (Bradford) felt the same doubt as Mr. Bateman in regard to the use of the cavity in the walls. The proposal had never been tried in the Bradford district. He supposed the idea behind the practice was that any waste heat or escape of gas would find its way through the roof or out of the walls in some way. As to gas competition with electricity, in Bradford they were right up against a special domestic rate based on the rateable value of a house—15 p.ct. of the rateable value as a standing charge per annum, and a charge of ¾d. per unit for all current used. This was a very low rate, and had only been ½d. before the war.

Mr. OUGHTON believed that in face of this fact, gas would have an advantage in cost.

Mr. ROPER rather doubted it. Taking the average house of an ordinary type, using electricity for lighting and possibly some small use like an electric-iron or a small radiator, the number of units used in a year at ¾d. per unit on top of the standing charge would not bring the price up to anything like 4½d. or 5d. per unit, as had been mentioned in the paper. It was very much nearer 3d.

Mr. OUGHTON held that gas at 4s. 2d. per 1000 c.ft. was equal to electricity at ½d. per unit for lighting.

Mr. ROPER said the special domestic charge in Bradford included any use—lighting or otherwise. The department offered to supply at this price, even if it cost more to produce, because they could make it up on the much higher charges to shopkeepers, &c. In regard to the introduction of electricity into the housing schemes, he had been told that the Housing Commissioner for his district had stated verbally (it was not put into writing) that electricity must be used in the houses wherever possible. It was ridiculous that there should be the expense of laying cables for the electric light and mains and piping for gas heating, cooking, &c. The gas undertakings supplying such houses ought to be allowed something towards capital cost. If they had to lay mains and services out of their ordinary revenue, it simply meant that the cost would have to come from the other gas consumers. It was a great pity that the housing authorities should have adopted this attitude when gas was quite able to do everything needed. They were constantly told that the prospective tenants of the new houses could not afford to pay what would be an economic rent on the costly new houses. Then how were they going to afford to pay for electricity?

Mr. P. M'NAB (Low Moor) moved a vote of thanks to Mr. Oughton; and Mr. LEASK seconded.

Mr. F. PEEL (Brighouse), in supporting the vote, said that, as Hon. Secretary, he thanked Mr. Oughton for having prepared the paper at short notice in an emergency. He, however, ventured to disagree with his figures as regards the amount of coal burned per hour in a coal-fire. Mr. Oughton had given an average of 2½ to 3 lbs. and had even gone as high as 5 lbs.; whereas under the coal-rationing scheme anybody who had burned above 2 lbs. per hour would be "in the cart" at the year-end.

The resolution was duly carried and acknowledged.

The meeting was subsequently addressed (privately) by Mr. A. L. Jennings, of Cleckheaton, on the progress and aims of the National Association of Technical Gas Engineers.

Canadian Gas Association.—The thirteenth annual convention of the Canadian Gas Association will be held in Ottawa on Friday and Saturday, Aug. 27 and 28.

Masonic.—Last Wednesday, Mr. W. M'Intosh Valon, the Engineer of the Stafford Corporation Gas-Works, was installed Master of the Staffordshire Knot Lodge of Freemasons, No. 726.

North of England Gas Managers' Association.—Saturday, May 1, is the date of the annual meeting at Newcastle-on-Tyne of the North of England Association, under the presidency of Mr. Harold E. Bloor, of York. Mr. A. E. Ruffhead will read a paper on "Recent Extensions at the Darlington Gas-Works;" and Mr. Geoffrey Weyman, M.Sc., one on "Oxide Purification."

Temporary Increase of Charges Act.—Under the Statutory Undertakings (Temporary Increase of Charges) Act, the Ministry of Health have made Orders authorizing the Oldbury Urban District Council to further increase the maximum price of gas from 5s. to 5s. 6d. per 1000 c.ft., and the Ambleside Urban District Council to increase their price from 5s. 6d. to 6s. 8d. per 1000 c.ft. (subject to rebate). The Ministry of Health have received applications for Orders from the Bolton Corporation and the Margam Urban District Council.

Perry Water-Gas System.—A great deal of information, as well as a large number of first-rate photographs, is to be found in a booklet [though described as a catalogue, it is really more than this] entitled "Water Gas: Its Production and Application," which has been forwarded by Messrs. Perry & Co. (Bow), Ltd., whose London Office is at No. 56, Victoria Street, S.W. The firm operates Smith's and "K. & A.'s" water-gas process; and it is, of course, this with which the booklet deals. The two-generator system is explained; and the advantages claimed for it—the first three of which are small capital outlay compared with retort-house plant, &c., of similar capacity, large output of gas per ton of fuel, and low CO_2 content. The results obtained by gas-works using the Perry system, with average present-day gas coke, are stated to include over 65,000 c.ft. of gas per ton of coke—about 34 lbs. of coke per 1000 c.ft.—with a maximum CO_2 content of 5 p.ct., and an average of from 3 to 4 p.ct. The calorific power of the blue gas is about 310 B.Th.U. The installations illustrated in the booklet range downwards from plant at Amsterdam of a capacity of 2,125,000 c.ft. per day; and there are views of the 50,000 c.ft. size plant.

STANDARD METHOD OF SAMPLING AND TESTING SPENT OXIDE.

The advance in the price of the sulphur unit in spent oxide, and therefore the greater accuracy necessary in both sampling and testing, has drawn attention to the want of standard methods acceptable to both the buyers and sellers of spent oxide. Such standard methods exist for ascertaining the value of other sulphur raw materials. The buyers of spent oxide have, therefore, drawn-up the following standard methods for sampling and testing spent oxide. The methods have been submitted to the National Gas Council, who approve of them, and sanction their publication.

SAMPLING SPENT OXIDE.

Samples sent for quotation purposes are often assumed to represent bulk deliveries. This is almost impossible to be the case, as the bulk of the oxide may subsequently dry further, or become damper owing to exposure. It is also possible that portions of the heap of oxide which contain more or less sulphur may have become covered-up and not included in the sample, however carefully taken. The spent oxide should, therefore (for invoicing purposes), be again sampled during loading, and the greatest care taken to obtain correct proportions of lumps and fines, as these may contain different percentages of sulphur.

When deliveries are being made, daily samples are to be taken from every cart or wagon, and collected in an air-tight receptacle. It cannot be too strongly emphasized that samples must not be allowed to lie about exposed to the risk of drying, but must be mixed, ground, and bottled each day. When the delivery of the parcel is completed, all the daily samples are to be at once mixed and broken-down; and for this purpose coning and quartering is the best method.

The well-mixed oxide is poured several times on to a given centre. This ensures an even distribution of both lumps and fines in the form of a cone. The cone is then flattened and quartered. Two opposite quarters are discarded and the remainder again mixed, coned, and quartered, until the quantity is reduced to a convenient amount. This is now crushed until it will all pass through a ¼-in. mesh sieve, and at once bottled.

The above operation must be carried out as quickly as possible, to avoid alteration in the moisture content of the sample.

Samples should be of at least ½-lb., and must be packed in air-tight bottles or tins. No other receptacle may be used.

In taking the necessary samples, one must always be sealed and retained for reference.

TESTING SPENT OXIDE.

PRELIMINARY TREATMENT OF THE SAMPLE.

Before carrying out the analysis, the whole of the sample is further intimately mixed and broken-down, and reduced to about 100 grams, which is ground so that the whole quantity passes through a 20-mesh sieve.

ANALYSIS.

Moisture.—Five grams are dried for three hours at 100° C. in a water-oven. The loss of weight found on cooling and re-weighing represents the moisture.

Sulphur and Tar.—The dried residue from the moisture determination is to be extracted for two hours in a Soxhlet's apparatus with freshly-distilled carbon bisulphide. The carbon bisulphide is then distilled off; the flask blown cautiously out with air; and dried for two hours at 100° C. in the water oven. The flask is then placed on a hot sand-bath until the sulphur has just fused; care being taken that no loss by overheating and volatilization takes place. After the flask has cooled completely, it is again carefully blown-out with dry air and again weighed. The increase in weight, multiplied by 20, gives the percentage of sulphur *plus* extracted tarry matter.

Estimation of the Sulphur.—15 c.c. of concentrated (95 p.ct.) sulphuric acid are poured on to the sulphur and tar in the flask; and the whole is heated for two hours at 100° C. in a water-oven. After cooling, the contents of the flask are diluted with water, filtered, washed free from acid, and dried. The dried filter paper with its contents is placed in a Soxhlet's tube, and again extracted with carbon bisulphide. The bisulphide is distilled off, and the residue fused exactly as described above. The weight of the residue in the flask, multiplied by 20, gives the percentage of sulphur free from tarry matter in the oxide originally taken.

It cannot be too strongly emphasized that in many cases discrepancies which arise are due to faulty sampling. It is, therefore, urged that the greatest care be given both to the taking of the sample and to its preservation from alteration.

The Scottish Junior Gas Association (Eastern District) are to have their annual general meeting on Saturday afternoon, May 1, in the Heriot Watt College, Edinburgh. The business will include a short address on "Vertical Retorts as Applying to Smaller Works," by Mr. W. Temple Gardner, the Chief Chemist to the Woodall-Duckham Company, Ltd.

A lengthy programme has been prepared for the seventh meeting, at Stoke-on-Trent, on April 28 and 29, of the Refractory Materials Section of the Ceramic Society, under the presidency of Sir W. J. Jones. Among the papers are: "The corrosion of Coke-Oven Walls—II." and the "Action of Salt on Silica and Fire-Clay Bricks," by Mr. W. J. Rees; a "Symposium on Gas Firing," to be opened by Dr. E. W. Smith; and the "Casting of Gas-Retorts," by Mr. W. Emery. At the Berry Hill works, members will be able to witness the casting of a gas-retort.

LOOKING ON THE BRIGHT SIDE.

Writing in the "Gas Record" of Chicago, Mr. R. O. Jasperson says there is an unmistakable feeling of pessimism apparent in the gas industry in certain quarters, which feeds upon itself and grows. On the other hand, there is plenty of evidence of an optimistic spirit to cheer the heart of the gas man who truly believes in his business and seeks to advance its best interests. A number of problems face the gas industry; and among those mentioned, the author says it is likely that methods of cleaning-out mains which are becoming clogged with rust, naphthalene, and other deposits—some resulting from low-grade coal which has been dumped on the gas industry in war and other emergencies, and others resulting from long-continued usage—must be developed. In distribution, the industry is everywhere up against undersized mains and services, installed years ago, when no one dreamed of the present tremendous demand for gas in immense quantities. Another subject is that of meters. The maintenance of accuracy with drier gases is going to be difficult until the industry learns how to keep the diaphragms oiled and lubricated over long periods of time. Engineers will have plenty to do to develop labour-saving devices, to make-up for the scarcity and high cost of manual labour. Already a great part of the main digging work is being done by machinery, with a large saving in labour; but as yet there has been nothing perfected for digging service trenches—especially in hard soils. On the other hand, is it not true that almost everywhere the industry is doing more business, and better business, than ever before? Much of the new business in sight is dependent upon ability to get appliances; but far-seeing gas men who anticipate their needs will get appliances somehow. As one contemplates the various schemes by which the gas business may tremendously increase the volume of its revenue, one is, says the writer, "bound to feel that the gas man has not really got a start. It is an old business. It has its traditions, some of them hoary with age, and some which we would not lose if we could. There are others that warp the gas man's perspective, and hamper his activities to an appreciable extent."

Coal Tar and Alcohol for Motor Fuels.

In a Monthly Report of Investigations of the United States Bureau of Mines, Mr. W. A. C. Smith says the number of motor cars and trucks in service in America increased about 1700 p.ct. from 1909 to 1918. There was a gain of 560 p.ct. in the production of gasolene to meet this; while during the same period the production of crude oil in the United States increased only 95 p.ct. The number of automobiles is still increasing rapidly; and it seems unlikely that the quantity of gasolene produced can be added to by using more of the crude and making the product less volatile, as has been done in the past. The next fraction obtained from crude oil—kerosene—is in great demand; and the extraction of gasolene from natural gas also is approaching its maximum. The demand for fuel oil has been growing rapidly during the past year, and the price has more than doubled; so that it may prove unprofitable to crack more of the fuel oil into gasolene, unless the price of gasolene also is increased. The most important of several sources of motor fuel which will probably come into use in the future is the enormous quantities of oil-bearing shale, found chiefly in the States of Colorado, Wyoming, and Utah. Crude oil very similar to petroleum is obtainable from these shales. It will, however, require the investment of hundreds of millions of dollars and a period of many years to develop the shale industry, which will eventually be of great value. Benzol is of more importance to-day; and alcohol can also be used, though it cannot be blended directly with gasolene. Mixtures of alcohol, benzol, and gasolene can be made which will not separate on standing; and it is probable this use of alcohol will increase if the price of gasolene goes up. As to the future, it is estimated that, all sources considered, there will be a sufficient supply of motor fuel, though it is probable that it will be more expensive. It is anticipated that it will be necessary to design new engines to use fuel oil.

Works Committees and Industrial Councils.—Reprints are published by the Manchester University Press, of Lime Grove, Oxford Road, Manchester (at a price of 1s. net), of a lecture delivered in the College of Technology of that city last October, by the Right Hon. J. H. Whitley, M.P., on the beginnings and the possibilities of Works Committees and Industrial Councils. What is suggested in the lecture is a solution of the problem of how, on the one hand, we can have an ever-increasing standard of living and improved status of the whole of our population, and at the same time not diminish, but go on increasing, the services which we can render to the other nations of the world, in return for which the other nations will give us the services which we need from them. This, in Mr. Whitley's view, is the real essence of the industrial problem of to-day and to-morrow. He holds that the Works Committee should be made of equal importance with the National Industrial Council, and hopes that the establishment of these Committees will be the means whereby there can be spread throughout the ranks of the workers a real understanding of the problems of industry as a whole. A report of the discussion upon it is included with the lecture.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

"Engineer" and Mr. Helps's Demonstration.

Sir,—In writing my criticisms on Mr. Helps's demonstrations, it was far from my intention to belittle anything which he has done in popularizing the use of low-grade gas. On the contrary, we all appreciate the valuable work he has carried out in the face of great opposition.

With your permission, I will take this opportunity of answering Mr. Helps's letter, and to refer to some of your editorial remarks in the issue of the "Journal" for the 6th inst.

In order to clear the ground, it would be as well to state where I stand in these matters. I believe:

That low-grade gas can be burnt at least as efficiently and economically as high-grade gas.

That the percentage of inert gases for most purposes is of no practical importance as far as combustion is concerned.

That complete gasification of coal will result in:

(*a*) A conservation of coal.
(*b*) A large reduction in the amount of solid fuel to be handled.
(*c*) The simplification of works' processes, with greater power of control and increased efficiency.
(*d*) The reduction of capital outlay and working costs.
(*e*) The reduction of the price at which gas can be sold as the effect of (*a*) and (*d*).

Regarding the other claims, I do not believe:

That the handling of solid fuel shows a 5 to 1 reduction.

That gas can be made and distributed at one-third or one-quarter the London price of to-day.

That free services and the development of business inside consumers' houses can be dispensed with.

That Mr. Helps has fully realized the difficulties of distribution connected with gas of a low grade, either from the physical or the chemical standpoint.

In your opening remarks it is stated that my article "does not prove that there is nothing in complete gasification." I did not set out to prove this; in fact, I believe in it.

Mr. Helps gave certain figures, and drew certain comparisons, at his demonstrations; and surely he does not resent reasonable and impersonal criticisms of these figures. I did my best to analyze them and show their merits as well as their weaknesses.

Mr. Helps must be aware that the estimates of cost of building a gas-works and maintaining a supply of gas is not a question of public debate; it is a matter for calm study of facts and figures, and reasoned judgment, which is not looked for in the spontaneous replies given in public debate. I cannot be expected to challenge Mr. Helps on his opinion of my knowledge of the "principles concerned in the cost and selling price of gas." I must leave others to judge; but I am satisfied to have the verdict based on my contributions to the "Journal." I am glad to know that none of the objections I have raised present any difficulty; and in pursuance of this comment of Mr. Helps, coupled with his willingness to answer specific questions, I would like to ask him the following:

1. Does he dispute my net coals comparison, giving his system at 2·04d. per therm with coal at about 39s. per ton?
2. Will he give detailed estimates of his costs of making and distributing (no further than the service pipes) gas at 0·53d. per therm?
3. Will he give detailed estimates of the capital outlay involved for works, mains, and services, amounting to 0·40d. per therm?

With regard to the question of the handling of solid fuel, your editorial is quite correct in stating that my claim of an overall efficiency of 70 p.ct. for coke combustion is too high. I have amended this figure to 50 p.ct., and append a table prepared on these lines, which gives the factor for the conservation of coal as well as the handling of fuel.

Effective Thermal Units Supplied Per Ton of Coal (Millions).

—	From Gas. 60 P.Ct. Over All Efficiency.		From Coke. 50 P.Ct. Over All Efficiency.		Total.		Factor for Coal Requirements.	Factor for Handling Solid Fuel.
	Gross.	Effective.	Gross.	Effective.	Gross.	Effective.		
1. Horizontal retorts	7·15	4·3	14·0	7·0	21·15	11·3	1·19	1·79
2. Steamed verticals	12 0	7·2	9 8	4·9	21·8	12·1	1·11	1·50
3. Tully plant . .	20·0	12·0	—	—	20·0	12·0	1·12	1·12
4. Helps	22·5	13·5	—	—	22·5	13·5	1·00	1·00

Or comparing Nos. 1 and 4: No. 1 can supply a demand of 13·5 million units in gas, *plus* heat in coke, by the carbonization of 3·14 tons of coal. No. 4 can supply the same demand and also effect the services of the coke supplied by No. 1 by the expenditure of 2·63 tons of coal.

It is seen from this table that the effect on coal conservation compared with horizontal retorts is that the latter uses more coal by 19 p.ct.; 79 p.ct. more is necessary for the handling of solid fuel; and this figure is increased from the figure of 66 p.ct. in the original article by the reduction of coke efficiency to 50 p.ct.

In considering both factors in the last two columns, it must be remembered that these savings all over the country would be effected only if the present customers for coke would consent to take gas. If any turn to raw fuel, there is a distinct loss to the community.

Mr. Helps, in claiming a saving of 400 p.ct., is not only using a different basis of calculation, but is ignoring one of the fundamentals.

He plainly stated that the same work could be effected—*i.e.*, the same number of heat units supplied—by the handling of one-fifth of the solid fuel; and by drawing such a parallel he meant this interpretation to be accepted by his audience. Otherwise, what was the object of the two cartoons?

With regard to your editorial note on the subject of the price at Oldham, I was comparing the price for small domestic consumers. If average prices for present and pre-war years are taken, I have no doubt that the percentage increase will not be materially altered. In making this comparison, I was not attempting to attribute any shortcoming to the Pleno system; in fact, I qualified the remark by pointing out that this system is not in full operation. I only wished to remind your readers that there may not be any merit from the financial standpoint (company's or consumers') in a mere decrease in calorific value. If the change is accompanied by a decrease in the cost of thermal units, we can welcome it. I am convinced that the Pleno system, or any other complete gasification system, will conserve coal, save the handling of fuel, and reduce the price at which gaseous energy can be supplied.

I sincerely hope that Mr. Helps does not class me among the opposition referred to in the final paragraph of his letter. In my opinion, any system with the above advantages is bound to make substantial headway; and this progress will not be quickened by exaggeration. In fact, the only points in which I differ from Mr. Helps are in the matter of degree. My chief regret is that I cannot offer Mr. Helps such a district as he is seeking for a working trial of his system; for his request stands as an earnest of his *bona fides*, and a healthy natural optimism for the efficacy of his system.

ENGINEER.

April 15, 1920.

Stewart's Thermal Balance of Coal Distillation.

SIR,—I am not able to agree with your correspondent, Mr. H. Hollings, that there is any incompatibility in the figures given in my paper; and, consequently, I consider his subsequent deductions quite erroneous.

The distillation of coal requires a net heat supply of 1,800,000 B.Th.U. per ton. Of this quantity, 900,000 B.Th.U. are supplied (as Mr. Hollings points out) by the heat evolved—leaving a further 900,000 B.Th.U. to be supplied from external sources, as I indicated.

Confirmation of this may be found in Professor Lewes's "Cantor Lectures," 1911 (p. 27), wherein he gives:

Reaction heat	450 B.Th.U. per pound or 1,008,000 B.Th.U. per ton.
and additional heat required over and above the reaction heat	462 B.Th.U. per pound or 1,034,880 B.Th.U. per ton.

A total of 2,042,880 B.Th.U. per ton of coal.

The efficiency of heat transmission to the retort thus remains, as I stated, at approximately 50 p.ct.

E. G. STEWART.

Fulham Road Gas-Works, April 15, 1920.

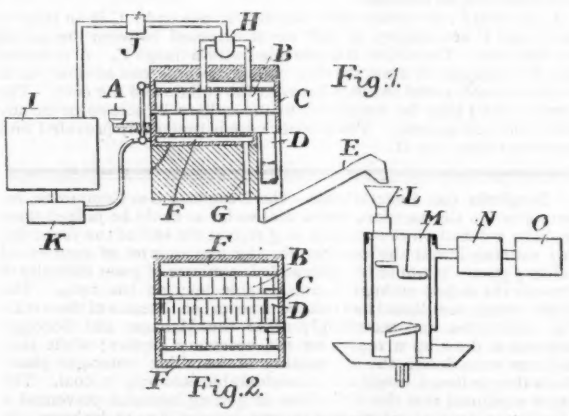
REGISTER OF PATENTS.

Gasification of Coal.—No. 123,738.

SMITH, C. H., of Short Hills, New Jersey, U.S.A.

No. 3916; Feb. 17, 1919. Convention date, Feb. 16, 1918.

This invention is directed to the treatment of coals that cake or swell when heated, and the subsequent utilization of the treated residue. There are certain raw coals—notably certain caking coals—the employment of which in a gas producer, the patentee points out, is accompanied by "objectionable features;" and an object of the invention is to subject such coals to a preliminary heating or partial distillation, whereby the resulting residue is made substantially tarless, and can be employed without encountering objectionable features, particularly such as caking and swelling.



Smith's Apparatus for the Gasification of Coal.

Fig. 1 illustrates diagrammatically plant wherein the invention may be performed, and fig. 2 a horizontal section of the furnace retort employed in the apparatus shown in fig. 1.

The coal is first crushed (if not already in a finely-divided condition), and then placed in a hopper A and fed into the retort or oven B of the furnace retort C. The retort B is fitted with two parallel shafts carrying paddles, and which shafts are arranged so that the paddles on one shaft overlap those on the companion shaft as the shafts rotate. The paddles move the coal to the interior of the retort from the charging to the discharging end, and at the same time agitate the mass thus conveyed. The residue or partially carbonized coal is delivered through the discharge conduit D upon conveying mechanism E. The conduit D is provided with sealing means (movable gates), whereby the coal residue from the oven B can pass through the discharge conduit of the conveyor without allowing the admission of a substantial amount of air into the interior of the retort.

The retort C is surrounded by a series of combustion chambers or flues F that serve as means for heating the retort B; the products of combustion passing from the furnace through a common passageway or waste-gas flue G. The coal is subjected to a uniform mixing and progressive heating up to temperatures approximating 800° to 900° Fahr. for approximately an hour, or until there results the particular type of coal residue desired—carrying on the treatment until the coal loses its caking or swelling properties. The temperature at which the coal within the retort is heated, and the period for which it is heated, are dependent to a large extent upon the character of the coal and the final residue desired, also upon the percentage of the tar vapours it is desired to remove from the coal prior to the introduction of the coal residue into the gas-producer.

During this heating or carbonizing operation, moisture and volatile matter in the coal are driven off and pass from the furnace in the form of gases and vapours to the hydralic main H, and then through cooling and purifying apparatus I, which also serves as a tar recovering apparatus. The exhauster J assists in removing the gases and vapours and forcing them through the cooling and purifying plant. After purification and cooling, the gases pass to the holder K, from which any part of the uncondensable gases can be supplied as fuel for heating the combustion chamber F.

The coal residue passing from the retort is delivered by the conveyor E into a hopper L, and finally delivered into a bye-product gas-producer M, equipped with suitable apparatus to cool and collect the products of gasification—*i.e.*, ammonia—in liquid form at N and the permanent gases in the holder O. The temperatures within the producer are higher than those of the preliminary distillation; and the temperature within the producer is sufficient to convert the nitrogen content of the coal into ammonia gases. The temperatures of the preliminary distillation were not sufficiently high, however, to effect this conversion—the required temperature for this purpose being approximately 1500° to 1800° Fahr.

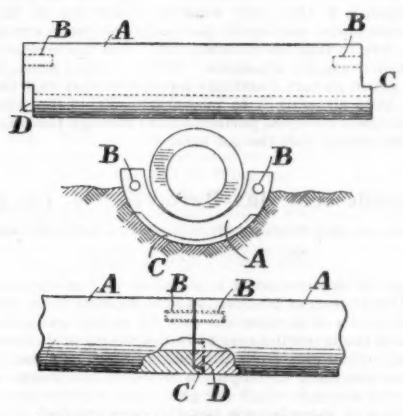
The carbon residue from the low-temperature or initial distillation contains most of the original nitrogen content of the raw coal—*i.e.*, a coal having an original nitrogen content of 1·52 p.ct. and a volatile content of 34 p.ct. after having been passed through the primary distillation or carbonization had a carbon residue with a nitrogen content of 1·76 p.ct. thereof, while the volatile content was reduced by such carbonization to less than 10 p.ct. of the residue—thereby showing that an actual concentration of the nitrogen content had been effected or realized by the primary distillation.

Laying Pipe Lines.—No. 139,044.

VINTEN, H. B., of Ramsgate.

No. 7628; March 26, 1919.

According to this invention, a bed is provided for the pipes composed of a series of semi-circular troughs having means in connection with their abutting ends, whereby rigid and alignable connections may be readily made between them.



Vinten's Method of Laying Pipe-Lines.

The illustration shows a side elevation of a section of the bed, a front view as in the laid position (showing a pipe thereon), and a fragmentary view in elevation of two sections showing the means for securing them together.

A is the body of one of the sections composing the foundation, which is moulded mechanically from a mixture of concrete and breeze, of a semi-circular form in cross section. In each end face is a pair of recesses B and a semi-circular lip C, with a corresponding cut-away portion or inlet D. Iron bolts or dowels are cemented in the recesses when the sections abut; and the lip and inset C and D respectively engage with each other, in which position they may be secured by cement if desired.

By forming the pipe-supporting members of semi-circular cross section, the patentee remarks that not only is the weight of the sections considerably reduced as compared with the rectangular blocks pre-

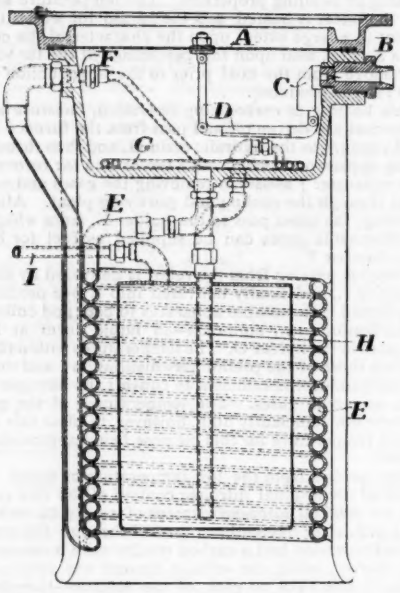
viously proposed, but the weight is distributed on the two sides of the trench, thus lessening the weight on the bottom; while the semi-circular lip and corresponding cut-away portion at the ends of the sections "secure a perfectly true alignment between the trough when their ends abut."

Admitting High-Pressure Lighting Gas into a Gas-Main.—No. 139,691.

VAN OORDT, J. B., of Voorburg, Holland.

No. 12,451; May 17, 1919.

The patentee remarks that in apparatus hitherto in use for admitting high-pressure gas (1500 to 2000 lbs.) from a steel cylinder into a gas-main the gas is permitted to flow intermittently from the cylinder into a reservoir until the pressure therein has reached 45 to 75 lbs., when the gas is admitted into the main, by means of a regulator, under the required pressure of about 150 to 200 cm. column of water.



Van Oordt's Carburettor.

The apparatus comprises a vessel (closed at its top by a membrane A) employed in connection with the inlet B—a screw coupling having a narrow passage for admitting the gas. The admission of gas is automatically controlled by a valve C adapted, under the influence of the pressure prevailing in A, to be opened and closed by a lever system D coupled with the membrane, which is adapted to yield when the pressure increases. In the bottom of the vessel opens one end of a comparatively long coiled conduit, the other end of which opens in the vessel near the top, at F. The conduit has an extension in the form of a spiral pipe G connected with a pipe H (outside the vessel) opening in a reservoir connected near its top with the gas-main I.

In the conduit E, the outer walls of which are in direct contact with the atmosphere, the liquid portion of the gas is completely gasified as it is free to take up sufficient heat, and the temperature of the gas thus formed rapidly increases. When flowing through the spiral pipe G the gas in its turn heats any liquid that may still be present in the vessel; thus allowing it to evaporate. From the pipe G the gas (having practically no liquid portions) flows through the pipe H into the reservoir, and thence into the gas-main I.

Incandescent Gas-Burners.—No. 140,339.

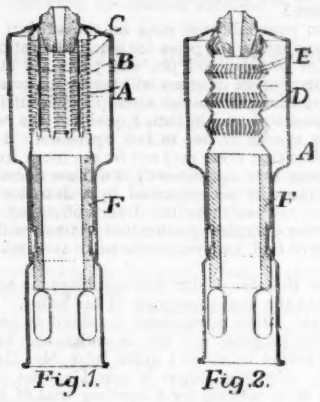
BRAY, A., and GEORGE BRAY AND CO., LTD., of Leeds.

No. 25,925; Feb. 9, 1918.

The object of this invention is stated to be "to improve the construction of incandescent burners, so as to increase their efficiency and enable good results to be obtained with the poorer gas now common." The feature of the invention relates to the mixing grids through which the gases pass on issuing from the bunsen tube. In patent No. 1619 of 1907 it was proposed to employ a series of transverse slits on the cylindrical tube through which the gases issue into the cap space; and for convenience of manufacture the tube was grooved longitudinally at four points of its circumference. Now the bunsen tube is open at the bottom and closed at the top, and provided towards its upper end with deep flutes or grooves and with narrow slits in the outer portions of the fluted or grooved part of the tube through which the combustion gases pass to the burner-head.

In fig. 1 the bunsen tube A extends upwardly from the top of the mixing-tube to the inside of the burner-cap, and preferably of thinned section provided with deep longitudinal flutes or grooves B on the cylindrical portion. The fluted portions (preferably from the outside) are cut with transverse or circumferential slits C, so that the slit passages are principally in the side walls or outer portions of the flutes. This construction is said to give low resistance and good mixing and diminished liability to light-back, even under severe conditions—attributable to the directions of flow backwardly through the slits in the adjacent corrugations being largely in opposition to one another.

In fig. 2 the burner-tube A is made above the mixing-tube with a number of deep circumferential corrugations D, and the walls of these (longitudinally of the tube) are slit as at E—the thickness having preferably been reduced to reduce flow resistance and require less metal.



Bray's Incandescent Gas-Burners.

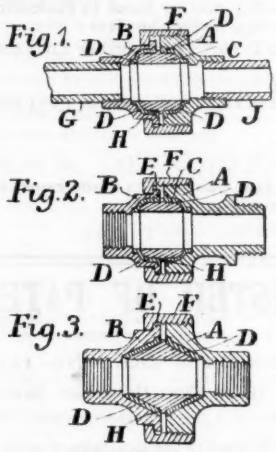
The usual potware liner F is provided in each of the forms described.

Pipe Joints.—No. 140,027.

FYFFE, T. L., of Dundee.

No. 27,161; Nov. 4, 1919.

According to this invention, soft metal seatings are placed between the hard-metal core and the pipe-sockets—being pressed integral with the latter, so that, on drawing the collars together, the core embeds itself in the soft-metal seatings, forming an air-tight joint.



Fyffe's Pipe Joints.

Fig. 1 is a section of a joint made in accordance with this invention connecting two pipes of the same diameter by screwed connections on the collars—the collars being provided with approximately semi-spherically shaped recesses. Fig. 2 is a section showing a joint, one collar having a flange and external screw to connect it to any existing fitting. Fig. 3 is a section showing a joint; the collar being provided with cone-shaped recesses.

A and B are two collars each swelled at one end; C is an interior core; and D are seatings of soft metal disposed between the collars and the core. The collar B is provided with a flange E. A coupling ring F is adapted to draw the two collars towards one another, so as to grip the soft metal seatings between the collars and the core. The pipes G and J may be connected to the collars by screws or in any other effective manner. The interior core is preferably provided with a central rib or stop H.

Drogheda Gas Undertaking.—The Drogheda Gas Committee, reporting to the Corporation, stated that so far as could be judged there would be a deficit on the working of £3276 at the end of the year; but they estimated that the receipts for the first quarter of 1920 would realize £3300. It would be, they added, a matter of great difficulty to wipe-out the deficit without a considerable levy on the rates. The Local Government Board had refused to report on the state of the works. The Committee had accordingly asked the Manager and Borough Engineer to draw up a report on the necessary repairs; while they were now considering the advisability of installing water-gas plant, which they believed would effect considerable economy in coal. The Mayor explained that the difficulties in getting material prevented a reduction in the amount of unaccounted-for gas, due to leakage. In regard to the deficit, the sum indicated was, roughly, the amount due. But the money could not be collected for a good while after the termination of the quarter; so that the Committee were practically left for three months without any money to carry on. To meet the contingency, arrangements would have to be made through the estimate. The report was adopted

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

REVISION OF THE STATUTORY UNDERTAKINGS (TEMPORARY INCREASE OF CHARGES) ACT.

Tramways (Temporary Increase of Charges) Bill.

In the House of Commons, on Monday of last week, the Temporary Increase of Charges Bill had second reading, and was referred to a Standing Committee. We give a few extracts from the speeches made during the debate, as these disclose the attitude of the various members on the subject of the readjustment of the financial conditions of statutory undertakings.

Mr. Neal (the Parliamentary Secretary to the Ministry of Transport), in moving the second reading of the Bill, said that in 1918 an Act was passed entitled the Statutory Undertakings (Temporary Increase of Charges) Act, which enabled an increase of charges to be made by a number of statutory undertakings. In the case of tramways and light railways running upon public roads an extension of the powers of the Act had been found now to be necessary. By reason of matters which he would briefly explain, the financial position of the undertakings was such as to call for some relief. There were 263 of these undertakings in the country. Of these, 66 were municipal undertakings; the rest were statutory companies. All were limited in charging powers, but in varying ways according to the special statutes under which they were constituted. The municipal undertakings showed an estimated surplus £73,695,000, without making any provision whatever for renewals; and the cost of renewals was, at the lowest, three times what it was before the war. In addition to this there were certain arrears of renewals to be made good. Some of these tramway undertakings were already serious burdens upon the rates. There were some twenty which, in the last financial year, had rate subsidies. Private companies were no better. There was something like £15,500,000 capital invested in these companies; and the balance to meet all priority charges (such as debenture interest and preference stock) and to provide for renewals, was estimated at £455,000. Quite recently there had been an agitation by the tramway workers for increased remuneration. This matter became a subject of discussion before the Industrial Council; and they arrived at a unanimous conclusion that it was necessary that there should be an increase in the rate of pay given to the employees in these undertakings. But they were equally clear that it was impossible for this recommendation of the Council to become effective unless some power was given to increase the charging rights of these undertakings beyond those which were permitted by the Act of 1918. There were certain methods by which these increases of charges could be brought into operation. The usual method was by means of Private Bills. He did not think that anybody would say that in the case of 263 undertakings, many of which required relief, it would be anything but a gross scandal and a waste of public time and money if each of them was required to promote a Private Bill, even if they could get the necessary sanction to do it, as in the present session of Parliament there would have to be special facilities given for the purpose. Another method would be by a General Act authorizing all the undertakings to increase their maximum charges by certain percentages. But a measure of this character was not called for. There were some undertakings, both municipal and companies, which would not be able on the figures, so far as they had them before them, to justify an increase above the maximum rates and charges. As to companies, there was still a third method open. This was that the Minister of Transport should exercise the power vested in him by the Transport Act, and take possession of the companies, and then give them an award directing them to increase their actual charges. There were objections, both in principle and practice, to this method. Mr. Neal proceeded to explain the terms of the 1918 Act, and then indicated the main points in the new Bill, which was reproduced in the "Journal" for April 6, p. 29. Regarding local authority tramway undertakings he said it was proposed that they should have no increase under the Bill which would do more than carry on the undertaking in a way which permitted its solvency without contributing anything in relief of rates. As to the companies, the limitations of the 1918 Act were abolished, and other methods were to be substituted which he hoped would be satisfactory. It was proposed that powers should be vested in the Ministry to relieve undertakings temporarily from onerous and unremunerative provisions which hampered the working of them. The Minister might make Orders authorizing the necessary increase of charges by the municipalities—again with the same limitation that they should not make a profit in relief of rates—and by companies such as might be necessary to enable them to pay a reasonable return upon their capital. For this purpose they had taken the exact words from the resolution passed by the House in dealing with the London Underground Railways as to a reasonable return upon capital. The Minister proposed by this Bill that he should act upon the advice of advisory committees to be set up, which should consist of the Light Railway Commissioners *plus* members to be selected for the purpose from the advisory panel which was established under section 23 of the Ministry of Transport Act. But inasmuch as the matter was quite urgent, and some of the companies were in the greatest possible difficulty in meeting both their current obligations for renewals and the further liabilities coming upon them by reason of the recommendations of the Whitley Council—namely, that the men should be paid an immediate advance of 5s. a week to be followed by a further 1s. in June—it was desirable that the Minister should have power to act promptly. A considerable mass of statistics had already been obtained to enable him to do so. Therefore, the present Bill proposed that he might make interim Orders, which would not have validity for a period of more than six calendar months, and that he should forthwith, upon the making of an interim Order, refer the matter to the Advisory Committee for consideration and report, so that a more permanent Order might take its place. Then there was a provision for review, either at the instance of the Minister or at the request of the local authority or company concerned, or, in the case of municipal undertakings, by twenty ratepayers. A further provision was that the cost of these inquiries—which, it was hoped, would be quite light, by reason of the avoidance of any large expenditure in the matter of professional witnesses and counsel and the like—should be borne by the undertakings themselves. The reason for this was that they were relieved from the much more onerous burden of the cost of promoting Private Bills in Parliament. Another provision was to limit the duration of the Act to exactly the same period as that to which the House had limited the powers of the Minister with reference to railway authorities—namely, during the two years of control which was sanctioned by the Statute (Ministry of Transport Act) *plus* eighteen months. Therefore, there was a time-limit to the Bill of Feb. 15, 1923. In the meantime, the companies and the municipalities would have gained experience, and they would be able to say whether it was necessary for them to make further application to Parliament, either privately or by Public Bill. Unless some such measure as this received the approval of the House, there would be a very serious position created for the tramway undertakings of the country, both municipal and company-owned.

Colonel Wedgwood, in moving that the Bill be read "upon this day three months," said statutory companies had made a bargain with the State. Under the terms of this bargain they were entitled to a certain franchise—the right to make tramways. Owing to the war, the bargain had turned out to be unsatisfactory to the private companies. But suppose the bargain had gone the other way—that it had turned out more satisfactory to the private companies than to the public—would they then have had a Bill introduced to give the public more advantageous terms than those which the original bargain secured to them? They would have been told that it was monstrously unjust to alter the terms of a bargain made between the Government and a private company—that the country had entered into a bargain, and that, whether the public gained or lost by it, they would have to stick to it. Now they had the reverse side of the shield. Immediately, as in 1918, the Government—which looked with almost tender care after the interests of these statutory companies, and, indeed, after all vested interests—came forward with proposals to break the bargain made, inasmuch as it had proved disadvantageous for private enterprise. This seemed to him to be a wrong way of dealing with these things. Many people had entered into bargains with public authorities—for instance, to do certain work; and they had found that the contract did not pay them. But they stuck to their contracts. Let these people stick to their contracts, too. They would be sold up. They would be bought up by the municipalities and the county councils at a fair market price. The Government and members of the House asked that when the municipalities or the county councils bought up these tramway concerns they should pay, not the fair price at which the bargain was originally made, but one enormously increased by the passing of this Bill. An immediate result of the second reading of the Bill would be that the shares of all the companies concerned would rise. If the Bill was defeated to-day, these shares would drop to-morrow. When the Bill was passed by a triumphant majority, all the shares would rise. They saw this happen in 1918, in the case of the water and gas companies. The very introduction of the 1918 Bill immediately sent up prices on the Stock Exchange. The public interest was that the bargain entered into by these companies should be carried out to the letter.

Lieut.-Colonel Malone seconded the amendment.

Sir H. Nield said the speech to which they had just listened was self-condemned as most unreasonable, having regard to recognized facts which had been forced upon the whole world by reason of a cataclysm which had never been known before. He did not know what his hon. friend meant by talking about these companies becoming insolvent, and then that the municipalities would be able to buy them on advantageous terms. What more advantageous terms could they get than those already given to them by the Tramways Act of 1870, whereby they could buy the whole thing at the price of old metal? This was a provision which he was perfectly sure was never contemplated as giving a public authority the right to buy a going concern at a break-up price. But the municipalities obtained this power under the present law. The hon. member who introduced the Bill referred to one object—namely, getting rid of onerous conditions. He should like to see this part of the Bill in operation. He was interested in county tramways. He would like to ask any member who had the material to investigate the dividends paid by tramway companies upon their shares for the last twenty-five years; and on inquiry he thought it would be agreed that the remuneration received by the shareholders was neither outrageous nor excessive. The provisions of the Bill were a bare act of justice. There was no one on his side going to oppose the Bill in so far as it proposed to meet increased charges for the workmen. This was occurring in every industry in the country; and these men had to obtain the same privileges as the workmen employed in other industries. If the Minister of Transport would give an undertaking that this was only to meet increased charges of this kind, or increased prices of rolling stock or anything of that nature, they would not oppose it; but if it was going to mean extra dividends for private enterprises, then they should go into the Lobby against it.

Mr. W. Graham said he was not able to agree with all that fell from Colonel Wedgwood; but he thought they were entitled to resist the Bill until they had some more information. There was at least one principle about the Bill which many of them in existing circumstances would support. The general provision for an increased charge was satisfactory when compared with a Private Bill or Provisional Order for increased charges. Here they had a General Act which gave what was apparently a general power; and to this extent it marked a very real advance on the individual effort to secure a concession of the kind, which was true of other lines of public activity. He noticed in the clause which applied to municipal authorities, there was no reference to prospective development; whereas there was a definite reference to prospective development where the companies were concerned. On this point he was hopeful they might have some explanation that

there was something in the finance of these tramway undertakings which met the point. The second paragraph dealt with the provision in the case of private enterprises of interest on loan capital and a reasonable return on share capital—regard being had to prospective development. An attack on the Bill would be much better directed to some limitation of the returns to those private undertakings on the capital invested in them. Here they were dealing with what was in every area substantially a monopoly. These companies had got powers, and so far they were removed from competition. It was not unreasonable to ask that Parliament should substitute for what might be regarded as a reasonable return on capital something which would be in effect a limited return on capital, without being at all unfair to anyone.

Major BARNES said it was clear that the general principle of the Bill was going to be met with little or no opposition. They were really entering upon a very important situation in dealing with the Bill, because it raised a very much larger question than was covered by the actual scope of the Bill itself. They were dealing here with tramway undertakings merely; but the Bill itself was based upon a precedent set up by the financial resolutions under which the London Railway Bill was brought in. This was the first move in the direction of legalizing increases in charges for transport facilities. They had the term, "a reasonable return on share capital," which arose in connection with this resolution; and the action which the House took on the Bill would be the precedent upon which it would be asked to act later on in other cases. He agreed with the principle of the Bill, that charges must be increased. What would govern the charges, among other things, would be the consideration of what was a reasonable return on share capital, regard being had to the pre-war financial condition of the company and its prospective development. This opened up the whole question of the value of the company. What figure, in deciding what was a reasonable return on share capital, was the share capital to be taken at? Was it to be taken at its face-value, or at the value at which it was quoted on the Stock Exchange prior to the war—say, on Aug. 3, 1914—or was the share capital to be taken on a present-day valuation of the undertaking? It was obvious that every undertaking which was worth anything at all was worth more to-day than it was before the war. It would be helpful if the Minister could give them some information as to whether the share capital of an undertaking was to be based on pre-war or post-war value. In regard to the term "reasonable return," it would be better if a fixed return was substituted.

Sir E. GEDDES (Minister of Transport) said he would like to refer to the remarks of Colonel Wedgwood. He said, in effect, that this was a Bill to enable private companies to be placed in a much more healthy condition financially—that it was a Bill brought forward after pressure from vested interests, and that it was to increase the value of the properties so that the proprietors might benefit thereby. There was no foundation whatever for this. Any question of permanently increasing the charging powers of these undertakings was negatived by the fact that, whatever powers the House chose to give to any authority lapsed at the end of eighteen months from August next—in February, 1923. It was a temporary provision; and simply, in order to fix a date, they took the same time that the similar provision lapsed for railway charges. This was fixed at a time in order to enable the railways to promote, if they wished, Private Bills to increase their charging powers. Then was the time for the House, in dealing with these Private Bills, to exercise the control which it ought to exercise, and to revise the bargain in a fair way. He admitted that the State gave certain powers in return for certain obligations, and that bargains should be revised both ways; and when these temporary bargains came to an end, it was then that they ought to deal with the relationships and the bargains which these undertakings might make with the State. As to what a reasonable return was, and whether it was on the nominal capital or on what share capital, he should very much regret if he had at this stage to interpret it. They took the wording which the House adopted in dealing with the Bill put forward by the London Combine—that a reasonable return on capital was a reasonable provision. They had added to this something which he thought was a safeguard—that regard should be had to the pre-war return upon the capital. He put this in because he did not wish to let it go from the House that the reasonable return should be taken on general lines, regardless of the pre-war return on capital and regardless of the pre-war financial position of a company.

Mr. GRIFFITHS asked if there was any method of ascertaining whether the value of the shares had gone up since 1918.

Sir E. GEDDES said he could ascertain what the value of the shares would be in a great many cases; but that would be a matter for the Advisory Committee to go into. For this purpose the Advisory Committee was put in. It was intended to have a very exhaustive inquiry—and they were on it already—into each case.

Major BARNES remarked that a tramway undertaking might make a revaluation of its concern and issue bonus shares and double its capital. Would this doubled capital be regarded as capital upon which a reasonable return would be made, or would it be its value before the war?

Sir E. GEDDES said he could not imagine that any Advisory Committee would be so foolish, and so lacking in judgment, as to adopt this sort of valuation. But if these matters offered any real difficulty, when they came to consider them in Committee, the Government was most anxious to meet these points. There was not the least intention of putting the undertakings into any better position until they came forward with Private Bills. He attached the greatest importance to one of the points which had been brought forward; and that was the bargain with the State. There was a bargain with the State; and if the undertakers came forward—be they railways or tramways—and said, "We want one side of the bargain altered," he wanted the other side altered also. It was not that the Ministry wanted these increased powers; but they had to do something. The points which had been raised, they would endeavour to meet in Committee.

The amendment was negatived, and the original question was put, and agreed to.

The Bill was then read a second time, and referred to a Standing Committee.

PUBLIC UTILITY COMPANIES (CAPITAL ISSUES) BILL.

In the House of Commons on Monday last week, further consideration was given to the Bill "to provide for the variation of the provisions regulating the raising of capital by companies carrying on certain statutory undertakings." The text of the Bill was given in the "JOURNAL" for Feb. 17 last (p. 375); and a report of the previous proceedings before Standing Committee appeared in the issue for March 16 (p. 640).

Mr. BRIDGEMAN (Parliamentary Secretary to the Board of Trade) moved, in sub-section (1), to leave out the words "gas or water undertaking," and to insert instead thereof the words "undertakings to which this Act applies." As introduced, he said, the Bill related only to gas and water companies; but a certain number of electricity, tramway, and hydraulic power companies pointed out in Committee that they were subject to the same disabilities that the Board of Trade were seeking to remove from gas and water companies, and they asked therefore to be included in the Bill. They were, of course, subject to the Electricity and Tramways Companies Act under the purview of the Ministry of Transport; but the Minister agreed that they should be included in the Bill. Subsequent and consequential amendments would provide that, instead of the "Board of Trade," the "appropriate Government Department" should be inserted, so that gas and water and hydraulic power undertakings should be referred to the Board of Trade, and electricity and tramway undertakings to the Ministry of Transport.

The amendment was agreed to.

Further amendments made: In sub-section (1), leave out the words "Board of Trade" ["with the consent of the Board of Trade"], and insert instead thereof the words "appropriate Government Department;" leave out the word "Board" ["such terms and conditions as appear to the Board"], and insert instead thereof the word "Department."

Mr. BRIDGEMAN next moved, in sub-section (1) (*a*), to leave out the word "sale" ["offer for sale to the public"], and insert instead thereof the words "subscription by." The intention was to make it quite clear that, if they did away with the necessity of issuing the stock by auction or tender, they provided that the company should not be allowed to make an arrangement with their friends behind the backs of the public for taking up shares at an advantageous price. Paragraph (*a*) of the sub-section, amended as proposed, would then read as follows:

> Offer for subscription by the public any such stock and at a fixed price lower than the nominal amount of the stock; and all allotments in respect of such stock shall be made as nearly as possible *pro ratâ*.

This suggestion was made by Sir F. Banbury, and was generally agreed to in Committee; but they could not then find exactly appropriate words.

The amendment was agreed to.

Further amendments made: In sub-section (1) (*a*), after "a" ["and at a price lower than the nominal amount of the stock"], insert the word "fixed;" after the word "stock" ["amount of the stock"], insert the words "and all allotments in respect of such stock shall be made as nearly as possible *pro ratâ*."

Sir HENRY COWAN moved at the end of sub-section (1) (*a*), to insert the words:

> "Provided that the appropriate Government Department may dispense with such of the conditions imposed by this sub-section in the case of any gas undertaking in which it is proved to their satisfaction that the issuing of capital required for such undertaking in strict conformity with the conditions imposed by this sub-section would prejudice the raising of such capital or the obtaining of the best possible price therefor."

This amendment was rendered necessary by the adoption by the House of the three amendments just moved by Mr. Bridgeman. The position of the small gas companies under the Act, with the amendments which had just been carried, would be a very peculiar one. In their case the amendments would largely nullify the benefits which the Act was intended to confer. These small companies had no free market for their shares. In the past they had been able to finance themselves, and to raise small amounts of additional capital from time to time, by appealing to a restricted local public, and particularly to local tradesmen. These local people had now no funds available for investment in such stocks. The conditions under which business was carried on nowadays were such that, broadly speaking, every trader required about double the capital that he formerly employed in his own business. The result was that these small companies would be unable to raise money from the local sources which had hitherto been open to them. The general investor outside the locality knew little or nothing of the concern. Any prospectus that could be issued would present the position of the undertaking in what would appear to an uninformed outsider to be a very unattractive form; and the issues of these small companies could not for a moment compete with the very attractive propositions which were constantly being put forward from other quarters. The only sources from which these small companies could hope to finance themselves in the immediate future were what might be called private quarters—that was to say, insurance companies, trust companies, and investment corporations, and, sometimes, private trustees who were in possession of funds for investment. Investors of this class, however, were not prepared to take up a small portion of a small issue, on the footing that they applied and obtained a *pro ratâ* allotment. Small companies applying to such people as these, in order to place their capital, were invariably told, "Yes, we are satisfied that it is a good thing, and, at a price, we are prepared to take it; but we want to take the whole issue, or at any rate a block." The whole issue might be only £10,000 or £15,000; and these institutions would not look at it on the footing that they were to be put into competition with other investors, and to obtain only a *pro ratâ* allotment. Underwriting was suggested as a way out of this difficulty; but he was advised that

underwriting was probably illegal in the case of a statutory company. In any case, it would be ineffective, because institutions of the kind mentioned would not be prepared to underwrite on the footing that they were to take up what stock happened to be left over—they wanted a firm offer of as much of the issue as might be required. Mr. Bridgeman, in Committee, said that the whole object of the Bill was to enable the companies more fully to do their duty by the public. This was not a Bill for the relief of gas companies, although, incidentally, it was hoped they might benefit by it, for no other industry had been so hardly hit by the war and the conditions arising from it. During the war, they had made no excess profits, their dividends in most cases had almost vanished, and they had no record upon which to appeal to the general public. They had large arrears of repairs, re-construction, and extensions which must be undertaken in the public interest. A dispensing power ought to be given to the Board of Trade, which could be trusted to exercise it in the interest of the public for the limited period during which the measure would be in force. Unless the Board of Trade were given power, at any rate, to say that they need not conform to every detail of the method prescribed, in those cases in which the claim could be established to the satisfaction of the Board, these small companies would obtain no relief from the Act. If Mr. Bridgeman saw any difficulty in adopting it and making it applicable to all companies, he would ask him to consider whether he could not, at any rate, accept it provided its application was limited to the case of smaller companies raising not more than £20,000.

Captain BOWYER seconded the amendment. It was in general harmony with the Bill; and it especially affected the smaller companies who, without this provision, would find it a dead-letter.

Mr. BRIDGEMAN said Sir H. Cowan was quite right in saying the object of the Bill was to enable these public companies to carry out their duty to the public; and he felt a great deal of sympathy with the case put forward, because it was clear that the small companies, at any rate, would have very great difficulty in raising fresh capital as the Bill stood. To accept the amendment in the words in which it appeared would really enable every company, small or great, with the consent of the Board of Trade or the Ministry of Transport, to avoid all the restrictions which were set forth in the Bill. He was very glad to see that the hon. gentleman had sufficient confidence in the judgment of the Board of Trade to wish to give them these very ample powers. But he (Mr. Bridgeman) did not think the House would like the Board of Trade to be able to allow any company whatever, small or great, affected by the Bill to raise their stock or shares in a way totally contrary to the clauses of the Bill. He proposed that they might perhaps allow the Board of Trade this amount of discretion in regard to small companies where the amount they wanted to raise did not exceed £20,000. The words he suggested were:

> "Provided that if in any case where the amount of money to be raised does not exceed £20,000 it is proved to the satisfaction of the appropriate Department that the observance of any of the limitations so imposed on the offering for subscription or allotment of stock would prejudice the success of the issue or the realization of the best price obtainable, the Department may dispense with such limitations."

This would give the Board power in the case of the smaller companies anxious to raise only a small amount. If Sir Henry Cowan would be content with this, he should not oppose him.

Sir H. COWAN thought Mr. Bridgeman had certainly endeavoured to meet him. In the circumstances, he would respond to his appeal.

The amendment was, by leave, withdrawn.

Further amendment made: In sub-section (1) (*a*), after the words last inserted, insert the words "Provided that if in any case where the amount of money to be raised does not exceed £20,000, it is proved to the satisfaction of the appropriate Department that the observance of any of the limitations so imposed on the offering for subscription or allotment of stock would prejudice the success of the issue or the realization of the best price obtainable, the Department may dispense with such limitations."

Mr. BRIDGEMAN moved in sub-section (1) paragraph (i) to leave out the word "or" ["or the amount authorized to be raised"] and to insert instead thereof the words, "to be issued by the Special Act, or as the case may be."

The amendment was agreed to.

Further amendments made: In sub-section (1), paragraph (ii), leave out the words "Board of Trade ["no consent given by the Board of Trade"] and insert instead thereof the words "a Department."

Leave out the words "Board of Trade" ["presented to Parliament by the Board of Trade"], and insert instead thereof the word "Department."

At the end of sub-section (1) insert a new sub-section:

> "(2) The undertakings to which this Act applies are undertakings for the supply of gas, water, hydraulic power, and electricity, and tramway undertakings, including light railways constructed wholly or mainly on public roads."

In sub-section (2), at end, insert the words:

> "The expression 'appropriate Government Department' means in relation to gas, water, and hydraulic power undertakings the Board of Trade, and in relation to electricity and tramway undertakings the Minister of Transport."

SCHEDULE.

PROVISIONS RELATING TO REDEEMABLE STOCK.

3. Save as hereinafter provided, the company shall not redeem out of revenue any preference or debenture stock so created and issued as aforesaid; but the company may, if they think fit, at any time during a period of ten years from the creation and issue of any such preference or debenture stock redeem out of revenue to an amount to be approved by the Board of Trade, any such stock created and issued for the purpose of defraying abnormal reparation expenditure due to circumstances arising out of the present war, and such redemption may be effected either by way of the repayment by annual instalments of the said sum, or by way of a sinking fund calculated to pay off the same at the expiration of the period aforesaid.

Amendment made: Leave out the words Board of Trade ["Approved by the Board of Trade"] and insert instead thereof the words "appropriate Government Department."

The Bill was then ordered to be read the third time.

MISCELLANEOUS NEWS.

THE COMMITTEE ON SMOKE ABATEMENT.

Coke-Fired Heating Appliances for Use in New Working-Class Dwellings.

At a further sitting at the Ministry of Health on Tuesday last * of the Departmental Committee on Smoke Abatement, evidence was submitted on behalf of the London Coke Committee with regard to the advantages of installing coke-fired heating appliances in new working-class dwellings. Lord Newton (the Chairman) presided.

Mr. E. W. L. NICOL, Engineer and Fuel Expert to the London Coke Committee, explained that on this Committee—which was formed in 1913 to promote the use of gas coke as fuel for domestic and industrial purposes—are represented the nine London District Gas Companies, under the chairmanship of Mr. D. Milne Watson. The Committee have taken active steps to promote the development and encourage the use of domestic heating appliances designed primarily for employment with coke as fuel, but capable of using also bituminous or anthracite coal. They selected and tested for thermal efficiency and general utility a number of representative domestic hot-water supply boilers; and, based upon the results of these tests, a standard specification for such a boiler was drawn-up, in which were embodied features and details of design and construction calculated to combine relatively high thermal efficiency with convenience and safety in working, cleaning, and general utility. A large and increasing number of coal-fired cooking ranges, usually fitted with relatively inefficient saddle boilers of inadequate capacity, have been, and are being, discarded in favour of gas cooking appliances; and boilers made to conform to the London Coke Committee's standard specification, as well as boilers of other approved types adopted by the Committee, have been supplied in considerable numbers. In the absence of well-founded complaint, it is claimed that these boilers have given general satisfaction. A special feature of them is their capacity for destroying refuse vegetable and animal matter. When completely enclosed, the draught of the chimney is concentrated upon the fire-box of the boiler, which is thus capable of generating heat sufficient not only to burn green and often wet vegetable matter, but also to oxidize quickly waste tin and other metal food receptacles. The standard specification also provides means by which the boiler shows an open fire which can be used for heating the apartment in which the boiler is placed, and for toasting or cooking by a Dutch oven, as required. Other cooking operations—such as boiling or simmering—can also be carried out; and the hot water supplied by the boiler tends to facilitate and cheapen other cooking operations completed by means of a gas-stove. Facilities are arranged so that in districts where the characteristics of the domestic water supply necessitate frequent internal cleaning, this can readily be accomplished without disturbing any of the pipe-connections to the boiler. Good workmanship, appearance, and finish are specified, with a view to the boilers being installed either in the kitchen or in the living-room of a working-class dwelling. There is adequate fuel capacity, and also means for close regulation of the draught, so that the boiler-fire can be banked over night or left unattended for long periods.

As to results, Mr. Nicol said that experience extending over a period of five years, with the smallest size boiler of this type, tends to prove that its capacity is adequate for all reasonable hot-water requirements of a family of five or six. One hour after lighting the fire, sufficient hot water can be drawn-off for a 20 gallon bath at a temperature of 100° Fahr.; and enough hot water for two or three baths of similar quantity and temperature can be drawn-off at about half-hour intervals. In a small household, in ordinary circumstances, the coke consumption of this boiler does not exceed 28 lbs. per day of twelve hours. At 50s. per ton, the fuel cost should not exceed 7½d. per day. The boiler has sufficient margin of capacity to operate a radiator; but in normal circumstances the heat radiated from the boiler itself assists appreciably to maintain the atmosphere of a six-roomed house at a comfortable temperature, which, supplemented by means of a gas-fire as occasion warrants, eliminates the necessity for an open coal-fire except during cold weather.

During the cold winter months, he went on to say, the London Coke Committee recognize that many people prefer an open fire; and they have therefore directed attention to the development of open-fire grates, with a view to secure the active and satisfactory combustion of ordinary gas coke, while at the same time retaining all the desirable features of a modern barless-type grate as designed for use with bituminous coal. Experiments extending over a long period tend to prove that this can be accomplished without serious additional cost.

Going on to speak of the Committee's success in the industrial field, Mr. Nicol said this might be gauged by the fact that many of the largest and most economical electric power stations, and others to a large and increasing extent, now use smokeless coke as fuel, not altogether with a view to eliminating the emission of smoke, but simply because it pays to do so. The Committee suggest that gas and coke, with suitable apparatus, provide a complete solution of the domestic smoke problem; and they feel that, in the light of their experience and present knowledge, the continued manufacture and installation in new dwellings of heating appliances designed for use with smoke-producing

* See also "JOURNAL" for March 30, p. 757.

bituminous coal only is a profound mistake. After considerable experience and close study of the subject, Mr. Nicol said that he was forced to the conclusion that the most practicable way in which a beginning might be made to mitigate the domestic smoke nuisance would be to prohibit in new dwellings the installation of solid-fuel heating appliances limited to the use of crude coal. Such appliances installed in new dwellings should be capable of using ordinary gas coke or other smokeless fuel, as and when it becomes available at a price comparable with that of ordinary coal; and regulations might be framed which would tend to secure this object without undue risk of inflicting hardship, and with positive advantage to consumers.

Any radical modification in the process of gas making, with a view to produce a form of coke better suited for use in existing domestic appliances, would inevitably involve greater cost of manufacture—due, among other items, to the largely increased plant required—and for economic and practical reasons any such modification of existing works cannot in present circumstances be contemplated. It must also be borne in mind that the cost of, and losses incidental to, the distribution in relatively small quantities of a bulky and friable fuel such as gas coke are considerable, and add very materially to the selling price. The ultimate aim should therefore be to distribute the potential energy of coke through pipes or cables in the form of gas or electricity. But during the period of transition, the adaptation of domestic heating appliances to the use of coke as fuel would tend materially to improve atmospheric conditions. Used as a diluent in admixture with bituminous coal in existing appliances, the proportion of smoke-producing volatile matter in the fuel used can be reduced by one-half, with a positive gain in thermal efficiency, by using coal and coke in equal proportions. The cost of a domestic gas and coke heating equipment as recommended by the Committee would, in new dwellings, be very largely offset by the saving effected in building construction, as gas-fires and coke-fired boilers require only a relatively small flue left in the brick-built wall.

Referring to the subject of present and probable supplies of coke, Mr. Nicol pointed out that gas coke is produced and distributed throughout the country from some 1600 gas-works, carbonizing in all annually about 20 million tons of coal. Probably about 10 million tons of coke are thus available. It has been calculated that during the next ten years about a million new dwellings will be erected; and assuming a coke consumption of 5 tons per annum per dwelling, this increase in demand would necessitate the carbonization of an additional 10 million tons of coal, and the extension of carbonizing plant at gas-works by more than 50 p.ct., without taking into account the increment in demand for industrial purposes. He, however, expressed the opinion that, given greater freedom of action in the conduct of their manufacturing operations, and supplies of the necessary raw materials, there need be little doubt that gas undertakings can produce smokeless fuel, both solid and gaseous, in sufficient quantities to render all new dwellings independent of crude coal as fuel, and therefore absolutely smokeless.

He drew attention to statements contained in the late Prof. Vivian B. Lewes's book on "Coal Carbonization"; and said that, in an open grate, the comparative thermal efficiencies of a coal-fire and a coke-fire are shown in the following heat-balance compiled by the professor.

		Coal-Fire. P.Ct.		Coke-Fire. P.Ct.
Heat lost	Heat used in decomposition and volatilization	10	..	1·7
	Heat escaping in flue gases to chimney	43	..	51·4
	Heat lost in unburnt matter (smoke)	25·7	..	*Nil*
	Heat in ashes and grate	1·9	..	2·4
Heat used	Radiant heat	19	..	44

In conclusion, witness stated that the quantity of coal carbonized by the Metropolitan Gas Companies represented on the London Coke Committee is about 4 million tons per annum, and the coke made for sale some 2 million tons. While pointing out that coke, being produced by various processes from a mineral product, is, of course, liable to considerable variation in both physical and chemical characteristics, he gave the following as an approximate analysis of a representative sample of average quality: Moisture, 5 p.ct.; volatile combustible matter, 2 p.ct.; fixed carbon, 81 p.ct.; ash, 12 p.ct.

At the conclusion of his statement, Mr. Nicol was asked a number of questions by different members of the Committee.

The Chairman: You have no hesitation in condemning the use of crude coal?

Witness: None whatever.

Bailie Smith: You suggest prohibiting in new dwellings solid fuel apparatus limited to the use of coal. How do you propose to do this?

Witness: An Order might be made prohibiting the installation of such appliances. The apparatus employed should be capable of using either ordinary gas coke or coal. Grates as at present designed are unsuitable for coke, as they are unsuitable for anthracite. It is not the fault of the coke, but of the appliance.

Bailie Smith: Can anything further be done to eliminate the sulphur from the coke?

Witness: Not on a commercial basis; but coke as at present produced has considerably less volatile sulphur content than coal.

Sir John Lithiby: Can you explain how it is that several witnesses have said that coke contains from 10 to 15 p.ct. of moisture?

Witness: Made from suitable coal, it should contain not more than 5 p.ct. Coal as at present supplied to gas-works is largely unsuitable.

A Member: If coke is to become just as necessary in a house as gas, would you think it desirable to extend to it the sliding-scale restrictions which now apply to gas?

Witness: No, because with a gas appliance only gas can be used, whereas for a coke-stove there will be competing fuels available. It would not be a monopoly, if the use of anthracite were permitted.

Mr. E. D. Simon: Does not the fact that a coke-fire is not yet on the market rather destroy your recommendation as to legislation?

Witness: The difference between the coke-burning stove I have in mind and any other grate is so slight that it could become available as soon as there is any demand for it.

Prof. Cohen: Is there any likelihood in the future of the quantity of coke available being diminished consequent upon its extended use in the production of water gas?

Witness: The tendency at the present moment is in that direction. This would lead towards increasing the use of gas by cheapening its price.

Mr. W. S. Curphey: It seems from what you have said that there is no surplus coke available now. If complete gasification was resorted to, there would be still less coke on the market. What is the principle of the coke-grate?

Witness: The only difference between an ordinary coal-grate and a coke-grate is in the lining. We find that gas coke of ordinary quality burns quite satisfactorily. The usual air-spaces below the fire are needed. For the same amount of heat radiated into a room, considerably less weight of coke is required than of coal.

Mr. Simon: You have said nothing about central heating.

Witness: Coke is used very extensively in connection with central heating systems, except perhaps for use in tenements. I think this principle is hardly suitable for workmen's dwellings. The boilers recommended by the London Coke Committee (with the exception of those of the smallest size) are all of them suitable for central heating purposes.

GAS PREFERRED TO ELECTRICITY AT BIRKENHEAD.

The Watch Committee of the Birkenhead Corporation recently called on the Gas and Electrical Engineers to bring-up separate reports on the present street lighting and schemes for the improvement of the existing systems. The Committee eventually accepted the proposals of the Gas Engineer (Mr. R. H. Brown) for the re-lighting of the town on a modern system of both high and low pressure gas-lighting, with inverted-type lanterns (with the exception of the small number of streets at present electrically lit), at an estimated cost of £10,000; and the scheme has been accepted by the Council. It is hoped that it will be in operation by Oct. 1 next.

The scheme will involve the laying of 1¼ miles of high-pressure main, the fixing of 1000 high-pressure lanterns, and the replacing of all the old-type upright "C" burner lanterns with new lanterns to the number of 2400. It is estimated that the saving by the new system over the old, after paying all capital charges, will amount to about £3000 per annum.

The Gas Department are to be congratulated upon having obtained the sanction of the Council to carry out the re-lighting of the town by gas in preference to, and in competition with, electricity.

METROPOLITAN GAS COMPANY OF MELBOURNE.

Half-Yearly Meeting.

The Eighty-Fourth Half-Yearly Meeting of the Company was held at the Offices in Melbourne, on Jan. 28—Sir John Grice (the Chairman) presiding.

The Manager and Secretary (Mr. John Hinde) read the notice convening the meeting; and the Directors' report and the balance-sheet for the six months ended Dec. 31 were taken as read.

Output of Gas.

The Chairman said that, taking first of all a survey of the operations of the Company for the full year, 3395 million c.ft. of gas were sold during this period, as compared with 3435 million c.ft. in 1918—a decrease of 40 millions. Having regard to the disturbed conditions which prevailed during the third quarter of the year, this decrease for the twelve months' operations was not unexpected. The fact that the quantity of gas sold during the June half showed an increase of 6·36 p.ct. compared with the corresponding period of the previous year, had the effect of largely neutralizing the decrease of 8·25 p.ct. that was experienced in the December half of the year; the net result being 1 p.ct. decrease for the twelve months.

Restrictions.

The reduced consumption of gas during the December half was the result of the maritime strike, which continued from May until August. In view of the impossibility of obtaining coal from Newcastle by sea, and the necessity of conserving stocks, the Central Coal Board restricted the use of gas part of the time as between certain hours of the day, and at a later date allowed only 50 p.ct. of the quantity consumed during the corresponding period of the previous year to be used. These restrictions remained in force from June until August.

The Revenue Figures.

In the balance-sheet, they would see that the strike conditions so affected the Company during the period under review that no proper comparison of the operations could be made with December, 1918. The total quantity of gas sold was only 1629 million c.ft., as against 1775 millions to December, 1918; but the revenue was higher, because of the extra charge made for gas supplied during the three months in which the Company were compelled to obtain coal from Newcastle by rail instead of by sea. The total amount received from residuals was £110,819, compared with £140,319 in the corresponding half year—a reduction of £29,500. The maritime strike was accountable for a part of this falling-off; but by far the greater portion of it was attributable to the reduced price realized for sales of sulphate for export. The expenditure side showed that, though the Company carbonized 14,946 tons of coal less during the last half year than during the same period of 1918, the actual cost to the Company was £64,116 more. This increased cost was made up mainly by railing about 55,000 tons of coal from Newcastle, the cost of which amounted to 52s. per ton

landed on the works, as compared with a cost of about 28s. 10d. had they been able to obtain it in the normal way by steamer. In addition, the half year had to bear two increases in the ordinary cost of coal, which had recently been imposed—2s. 9d. per ton at the pit's mouth as from May last, and an additional 11d. per ton in freight as from October. The Company were paying largely increased amounts for labour, which would be felt even more during the current year. The net result of the abnormal conditions for the half year had been to reduce the amount available to carry from revenue to net revenue account to £77,406, compared with £140,563 for the half year ended December, 1918. Apart from the extra cost of overland coal, the additional price of material (whether raw or manufactured), the increased wages, and the reduced returns from sulphate of ammonia, the profits were very seriously affected by the reduction in the output of gas (owing to the restrictions previously mentioned), and the consequently smaller quantity of residuals produced for sale.

REPAIRS AND RENEWALS AT WORKS.

The second Woodall-Duckham installation, which was completed some time ago, would be put into commission as soon as the winter load rendered it necessary. The steel framing of the third Woodall-Duckham installation at the West Melbourne works was nearing completion; and the contractor would shortly be commencing the erection of the retort-settings. The piling and concrete foundations of the fourth setting of this system were completed, as was also the piling for the coal-handling plant which was to be used in connection with the full scheme of Woodall-Duckham installations; and the excavations for the foundations of the plant were in progress. The new purifier-house was ready for testing before being put into operation. The construction of No. 1 gasholder at Fitzroy was well advanced; and it was hoped that it would be ready for the next winter period. The reinforced concrete extension of the existing tank of the No. 3 gasholder at these works had been completed, and contracts let for the supply of the whole of the steel required.

GAS INQUIRY BOARD.

Notwithstanding the fact that the extra charge of 1s. 6d. per 1000 c.ft. of gas sold during August and September, and 1s. for the month of October (the period during which coal was being overlanded from New South Wales) had been sanctioned by the Government, a Special Inquiry Board was appointed by the Government to examine the books of the Company, and investigate the fairness of the charge the Company had made. The result of the investigation was embodied in a report by the Inquiry Board, who briefly found as follows:

That the increased price charged by the Metropolitan Gas Company to meet the additional cost of bringing coal overland during the shipping strike was fair and equitable.

That they were satisfied the whole cost of overlanding coal had not been borne by the public. The additional cost per 1000 c.ft. on the 1918 basis of sales per ton of coal was 1s. 10·81d. per 1000 c.ft., of which the public paid 1s. 6d.

That with the decreased sale of gas per ton of coal the amount actually met by the Company was 6d. per 1000 c.ft., approximately, which did not, however, represent the extent of the Company's loss, owing to the abnormal conditions prevailing.

That, while there was practically no reduction in the Company's costs or standing charges, there was a substantial shrinkage in all items of revenue.

That the shrinkage of revenue, combined with the additional cost of coal, adversely affected the Company, after allowing for the charge to the public, to the extent of 1s. 6d. per 1000 c.ft.

INCREASED WAGES.

In September last, as a result of the proceedings in the Commonwealth Arbitration Court, the minimum rate of wages was increased retrospectively to the previous March; and after the strike of gas workers in Victoria, the Company, following a conference convened by the Premier of Victoria, agreed to the payment of an additional 1s. per day to all those employees then being paid under the arbitration award and agreement. The total wages bill, as a result of these higher rates of pay, had been increased by approximately £21,000 per annum. The Directors made every effort to avert a stoppage of the industry prior to the date on which the employees went on strike. To this end, they offered to facilitate proceedings being taken in the Arbitration Court, and in the meanwhile to pay a minimum rate of wage consistent with the latest available figures of the Government Statistician, and to enter into an undertaking that, should the completed figures for 1919 show a further increase in the cost of living, such increase should be made retrospective to the date on which the Union initiated proceedings in the Court. The Union, however, declined to agree to the terms offered. Prior to any settlement of wages being arrived at, there was an agreement that the Union would, on the expiry of the present award in April next, apply to the Court or other constituted authority for fixation of wages, and to abide by any award made.

PRICE OF GAS.

Upon consideration of the figures placed before the shareholders, it would be abundantly clear that the price of gas must be increased in order to meet the added burdens the Company were under present conditions called upon to bear. It had been necessary this half year to draw upon the balance brought forward to the extent of £25,856; the reserve fund had been reduced from £34,393 to £25,511; and the meter renewal fund stood at £1227, which figure compared with £5098 at June 30 last. The question of freight on interstate shipping was now receiving consideration by the Commonwealth Government in the shipping interests; and it was understood that very shortly the rates for freight between Melbourne and Newcastle would be further raised. It would be noted, however, that the Company had been enabled, owing largely to the high price of sulphate of ammonia, to refrain from increasing the price of gas, except to a limited extent, since the commencement of the war; the price in June, 1914, being 4s. 4½d., and to-day 4s. 9½d. per 1000 c.ft., notwithstanding enormous all-round increases in material for the repair and renewal of plant during the intervening period.

GAS LEGISLATION.

No steps had yet been taken to pass an Amending Bill which would enable the Company to obtain fresh capital powers and a new works site. They had issued the last authorized and available shares, and borrowed up to the limit on debentures; and in neither of these directions, therefore, could they look to obtain additional funds to carry on the operations of the Company. Such a position was not only a serious one from the Company's point of view, but was inimical to the interests of the public and consumers of gas generally. With renewed facilities for raising capital, the Company could substantially add to its list of consumers, could increase the output, and by this means reduce overhead charges, which would all be in the direction of maintaining as low a price for gas as possible. Both the Company and the public had suffered, and would continue to do so until this extraordinary reluctance and inexplicable delay in passing fresh legislation had been overcome. Apart from the Company's financial difficulties, which an Amending Bill would have the effect of removing, there was also the matter of a new works site, which was absolutely essential to enable the Company to carry out the duty of supplying gas to Melbourne. Certain land had been earmarked and purchased for this purpose.

The position with regard to the urgent necessity of making adequate provision for the future supply of gas would be better appreciated when once it was realized that the sales of gas, which in 1898 were 983 million c.ft., had in 21 years increased 245 p.ct. There was no reason why the increase should not continue, possibly in the same proportion, for the next 21 years. In this event, the output would then be 11,712 million c.ft.

The report was adopted, and a dividend of 6s. 6d. per share was declared for the half year.

COAL AND ITS BYE-PRODUCTS.

Last month, Mr. J. R. L. Allott lectured before the Wolverhampton and District Engineering Society, on "Coal and its Bye-Products."

Describing the plant at a North Staffordshire Colliery, where the manufacture of coal into coke and its bye-products is extensively carried on, he pointed out that in the saturator the ammonia gas is caused to combine with sulphuric acid to form sulphate of ammonia; and as the formation of the salt proceeds, it crystallizes from the liquid and falls to the bottom of the saturator-box, and is blown out by steam on to a draining table where all superfluous acid is separated from the salt and runs back into the saturator. The salt is then placed in the basket of a centrifugal dryer, in which it is "whizzed" and then bagged for sale.

If concentrated liquor is to be made, instead of sulphate, the ammonia gas and steam from the still are led into large cast-iron vessels fitted with lead coils, through which cold water is flowing. The steam becomes condensed to water, which dissolves the ammonia—thus forming a strong solution containing 17 p.ct. of ammonia.

The creosote oil passing from the scrubbers contains about 4 to 5 p.ct. of benzol; and, to extract the latter, the oil is subjected to a distillation process similar to that for the ammoniacal liquor; the vapours being condensed in water-cooled apparatus. The cooled liquid (consisting of crude spirit mixed with water) is passed into a separator, where the water settles and is run off, while the lighter spirit remains on top and is continuously discharged into storage tanks. The crude heavy oil, after being freed from benzol, is passed through coolers, and again put into circulation. The crude benzol thus obtained consists of benzene, toluene, xylenes, naphthas, along with impurities such as pyridene, thiophene, carbon bisulphide, creosote, naphthalene, and pitchy substances.

As to the rectification of benzol Mr. Allott pointed out that the crude benzol is first redistilled in a large vessel holding about 7500 gallons, fitted with a column for fractionating. In this still, the crude benzol is by means of steam-coils heated to different temperatures, thus separating the mixture into its component parts. The various substances have different boiling points—benzene about 80° C., toluene 110° C., xylenes 135° to 145° C. and upwards, naphthalene 218° C., and creosote oil at various higher temperatures. Thus by heating-up the mixture of hydrocarbons known as crude benzol first to a temperature of about 85° C, all the benzene comes off first, and can be collected in a separate store tank. Then by raising the temperature to 115° C., all the toluene can be got to boil over, and at 160° C. all the xylenes. The impurities, naphthalene and creosote oil, are left behind in the still, and are worked-up into whizzed naphthalene and clear creosote in a separate building.

The spirit thus obtained requires to be chemically washed. This is carried out in large cast-iron vessels, of 3700 gallons capacity, fitted with mechanical agitators. The once-distilled spirit is mixed with sulphuric acid, and washed; the acid being run off and the spirit again washed with water to remove the spent acid. It is then treated with further washings of soda solution, and finally with water. By this treatment some ammonia, pyridene, tar acids, &c., are removed from the spirit. As it is not sufficiently purified, it is treated in another still fitted with a fractionating column and dephlegmator. There are twelve storage tanks each holding 11,000 gallons, or a total of 132,000 gallons. It is necessary, Mr. Allott pointed out, to check the results of the processes by frequent tests; and the work of the chemist is thus an important factor.

As to the distillation of the tar, the stills can either be fired with solid fuel or with gas; but towards the end of the distillation steam is used in an interior coil for better control. In this operation of distilling, like others, advantage is also taken of the different boiling points. The first vapours passing off (at a temperature from 88° to 170° C.) are a little ammonia water and some slight spirit. At 170° C., practically all the light oil has passed off. The receiver into which the distillate has been flowing is now changed, and the temperature steadily increased to 230° C., during which time the middle oil is distilled off, and run into a second receiver. The temperature is then increased from

230° to 270° C., to get off the creosote oil, which is run into a third receiver. The temperature is then again increased above 270° C., to get off the heavy or anthracene oil, which is run into a fourth receiver. During the time the anthracene oil is coming off, steam has to be added to the still.

Instead of running the condensed liquids into receivers, it is better to run them into pans to allow the naphthalene and the anthracene crystals to settle out before running the oils into the receivers. Ammoniacal liquor is distilled up to 100° C.; light oil, 170° C.; middle oil, between 170° and 230° C.; creosote oil, between 230° and 270° C.; and heavy or anthracene oil, between 270° and 350° C. The tar distiller knows by experience when to stop the distillation somewhere between 300° and 350° C., according to the quality of the residual pitch required, which is left in the still a little while to cool. It is then run into a large cooler. The middle oil from the tar distillation plant is washed and distilled for the manufacture of carbolic and cresylic acids, and pyridene is also made.

The naphthalene recovered at the benzol rectification and tar distilling plants is received into a cylindrical vessel fitted with steam-coils, melted and distilled in a still similar to a tar-still—the distillate being run into shallow pans and allowed to cool. When quite cold, the naphthalene separates-out as brown crystals; and from these the oil is run away. The crystals are then dug out of the pans, crushed, and dried through a whizzer to completely remove the oil—the naphthalene passing into another tank, fitted with steam-coils. It is again melted and pumped into a cast-iron still in an oil-jacket. It is then distilled a second time with acid, and the distillate collected in a receiving tank. It is once more melted, pumped into another jacketed tank, and distilled with soda a third time. The vapours of naphthalene are now practically pure, and are condensed and run into shallow pans as before, where the naphthalene solidifies into a white cake.

Mr. Allott then explained the conversion of benzene by treatment with heat, acid, and alkalies into the explosive, picric acid, or trinitrophenol.

GAS SUBSTITUTED FOR ELECTRICITY IN STREET LIGHTING.

High-Pressure System at Airdrie.

Considerable enterprise has hitherto characterized the Airdrie Corporation Gas Department in developing the undertaking since they acquired it from the Gas Company, both by extensions and renewals of plant and by the introduction of the newest and most up-to-date methods of gas production and utilization of bye-products. The latest venture of the Town Council is to scrap the electric street lighting arrangements, and to substitute high-pressure gas lighting both for arc and incandescent lamps, for which the way has so far been paved by the laying of high-pressure mains in the principal streets of the burgh. The first installation has now been completed under the direction of the Gas Engineer and Manager (Mr. Archibald Kellock); the whole of the work being carried out by the employees of the Gas Department. The Town Council are very gratified with the successful and effective way in which the scheme has just been brought into use. Undoubtedly, great improvement is apparent in the main thoroughfares; and the better illumination of the streets is much appreciated by the townspeople.

The previous system of lighting was by electric arc lamps in the main streets and public places. The agreement with the Electric Company for doing so expired a year or two ago; and the Town Council decided that for the future they would utilize the illuminant produced at their own undertaking, and accordingly handed over the lighting of the whole town to the Gas Department. The Corporation bought from the Electric Company the arc lamp columns, and had them adapted for high-pressure gas; arranging that, where electric arc posts are not available, the poles for carrying the trolley wires of the tramways should be utilized. A swan-neck was fixed on top of the pole; and the various connections for gas and the raising gear were attached to it. So far as the piping in the streets was concerned, the Department had already laid 1½ miles of mains in which pressure is maintained at 3 lbs. by means of a Donkin compresser that is also used as a booster for the outer districts of the burgh.

The high-pressure system adopted is that of the James Keith and Blackman Company. The installation comprises twenty Keith patent high-pressure inverted lamps, each with one mantle giving 1500 c.p. These lamps are fitted with the Keith patent automatic arrangement, by means of which they can all be lighted-up from a distance on starting the compressor. Conversely, they are all extinguished by stopping the compressor, or otherwise reducing the pressure to normal. The lamps are supplied with Keith patent raising and lowering gear. This dispenses with the use of flexible tubing, with all its disadvantages and unsightliness, and enables a sound joint to be made while still allowing the lamp freedom to swing on a ball-joint. The raising and lowering of the lamp for maintenance and adjustment purposes are effected by means of a winch, clipped to the tramway column, on which is also fixed the "control box" (containing a valve which, when necessary, controls each lamp individually, while leaving the bye-pass still burning), and also the temporary connection, to which is attached a flexible tube to supply the lamp with gas for maintenance purposes when it is lowered. When the lamp is detached from its top connection, gas ceases to flow, and consequently the bye-pass is extinguished. In order to relight the bye-pass when the lamp reaches its normal position again, a small cup of methylated spirit is ignited immediately before raising the lamp; and this methylated spirit continues to burn until the lamp is once more in position and the gas flowing through the bye-pass, which is immediately ignited by the burning spirit.

Owing partly to the cost and the difficulty of obtaining heat-resisting

USE Simmance's

DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.

Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

globes in the larger sizes, the Keith patent globe substitute is used, which comprises a frame carrying sectional curved pieces of glass, and a bottom bowl. In the event of the panes or the bottom bowl getting broken, they are easily and quickly removed at a small cost, compared with the price of a new globe, should this be broken. These patent globe substitutes are of handsome appearance, and have been found most satisfactory, being extensively adopted for public high-pressure lighting in London and elsewhere. The lamps are also fitted with stirrup-pieces, enabling the nipple to be readily removed for cleaning, &c., where necessary, without having to take down and dismantle the lamp. To minimize the effect of vibration on the tramway poles, owing to passing cars, &c., the Keith special form of anti-vibrator is used with most of the lamps; and it effectually absorbs vibration which might cause damage to the mantles.

The electric incandescent street-lamps are replaced with incandescent gas-lamps, automatically lighted on the Alder and Mackay pressure-wave system.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *April* 19.

In the London market pitch continues in strong demand at advancing values, the price to-day being over 130s. per ton net f.o.b. makers' works. Creosote is from 1s. to 1s. 1d. per gallon net and naked. Pure benzol and pure toluol are about 3s. per gallon, and solvent naphtha about 3s. 9d. per gallon. In other products there is nothing new to report.

The position of sulphate of ammonia remains unchanged.

Tar Products in the Provinces.

April 19.

The average values for gas-works products during the week were: Gas-works coal tar, 80s. to 85s. Pitch, East Coast, 122s. 6d. to 130s. per ton f.a.s.; West Coast—Manchester, 120s. to 125s.; Liverpool, 120s. to 125s.; Clyde, 125s. to 130s. nominal. Benzol 90 p.ct. North, 2s. 3d. to 2s. 4d.; crude 65 p.ct. at 120° C., 1s. 5d. to 1s. 7d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 2d. to 2s. 4d. Toluol, naked, North, 2s. 6d. to 2s. 7d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 3s. 3d. to 3s. 4d. Heavy naphtha, North, 3s. 4d. to 3s. 6d. Creosote, in bulk, North, liquid, 11¼d. to 11½d.; salty, 7d. to 7½d. Heavy oils, in bulk, North, 11½d. to 1s. Carbolic acid, 60 p.ct., 3s. 8d. to 3s. 10d. Naphthalene, £30 to £35; salts, £8 10s. to £9 10s., bags included. Anthracene, "A" quality, 8d. to 9d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

Markets generally are very firm, and in many cases the tendency is still upward. Pitch is steady at a slight advance above last quoted rates. Spot and near deliveries might be obtained for a trifle less; but not much business is being done in these positions. There are still plenty of buyers for future deliveries at much higher rates; but offerings are light. South Wales figures are higher. The current price of £7 per ton cannot be considered unreasonable while patent fuel makes £6, yet buyers are looking for a fall shortly. There appears to be some difficulty in this market, owing to the disorganized state of the railways; and it is reported that the companies are inclined to stop carrying pitch. Naphthalenes have provided a feature of strength lately, despite the lack of export licences. Pure refined flake is in great request, and making up to £33 per ton for good descriptions. Crudes vary from £12 upwards. A week ago fine quality was offered at £16; last week, some sellers were asking £21. Creosote and cresylic acid remain very firm. Benzols are steady. A recent report by an authority predicts that America will be an importer of petrol next year, and will have nothing to spare to meet foreign demand. Carbolic acid does not exhibit any material change; offerings being only small. Shipments of crystals are still being made; but the ordinary exporter cannot get licences to do anything in this way. Solvent naphtha is depressed, the cause of which is difficult to fix. It may be that available supplies are increased by the inclusion of some toluol, now that this article is not so much wanted for mixing with benzol. Intermediate products are still rather scarce; but it is hoped that the hold-up of export licences for a time will redress the position.

Latest quotations are as follows:

Benzol: 90% London 2s. 4d. to 2s. 5d., North 2s. 3d. to 2s. 4d.; 50-90% 2s. 2d. to 2s. 3d. London, 2s. 1d. to 2s. 2d. North; crude 60-65%, 1s. 5d. to 1s. 7d.; pure, 3s. per gallon naked.

Crude Tar: London, 72s. 6d. to 77s. 6d.; Midlands, 70s. to 72s. 6d.; North, 70s. to 75s. per ton *ex* works. Refined tar, 48s. per barrel (free) on rail.

Pitch: London, 130s. per ton; East Coast, 125s. to 130s. per ton; West Coast, 115s. to 130s., with Manchester 125s. per ton, and Glasgow 120s. per ton; South Wales, 140s. per ton.

Solvent Naphtha: London, 3s. 4d. Provinces average 3s. 3d. per gallon.

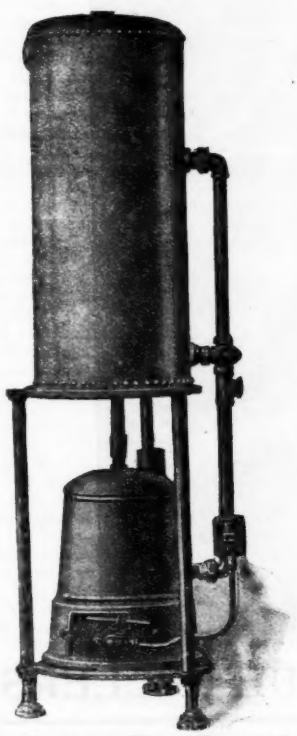
Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 2d. per gallon.

Naphthalene: Refined, £33 per ton nominal; crude, £13 to £18, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 3s.

Creosote: London, 1s. 0½d. to 1s. 1d.; North, 1s.; heavy oil, 10½d. per gallon in bulk.



No. 424. The "Energy."
Stands can be supplied to any desired height.

The "Main" Circulating Water Heater.

THIS Gas Heater is constructed throughout of strong cast iron with corrugated inner and outer jackets giving an unprecedented heating surface. The gases, after heating the inner jacket, are drawn to the base, and to reach the flue outlet must travel over the outer casing, thus utilising the heat to the utmost.

A really efficient thermostat is fitted; and the heat-retaining outside casing is made of steel, porcelain enamelled, giving the heater a most attractive appearance.

A sample will convince you of its efficiency.

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 6, Narrow Wine Street, BRISTOL; 333, Queen Street, MELBOURNE.

Anthracene: 40-45%, 9d. per unit per cwt.
Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.
Aniline Oil: 1s. 5d. to 1s. 6d. per lb., drums extra.
Aniline Salts: 1s. 10d. to 2s. per lb.
Cresylic Acid: 95%, 4s. to 4s. 6d.; 97-99%, 4s. 3d. to 4s. 9d. per gallon *ex* works London, f.o.b. other ports.
Carbolic Acid: Crude 60%, 4s. per gallon; crystals 40%, 1s. 3d. to 1s. 4d. per lb.
Salicylic Acid: Technical, 3s. 4d. to 3s. 8d.; B.P., 3s. 9d. per lb.

Sulphate of Ammonia.

The home demand is active, and most of the production is going in this direction. Export business is available at satisfactory prices, but cannot be satisfied for the present. American advices indicate an easier tendency, with less pressure from foreign buyers. Limited quantities have been sent to South America without any influence on the local market. Japan, which has been a drain upon this market for a considerable period, has bought much more sparingly. If inquiry is any guide to the situation, it would appear that Japan will again be taking large supplies. There are no stocks on the Pacific Coast, and makers still have old contracts to be completed.

American Tar Products.

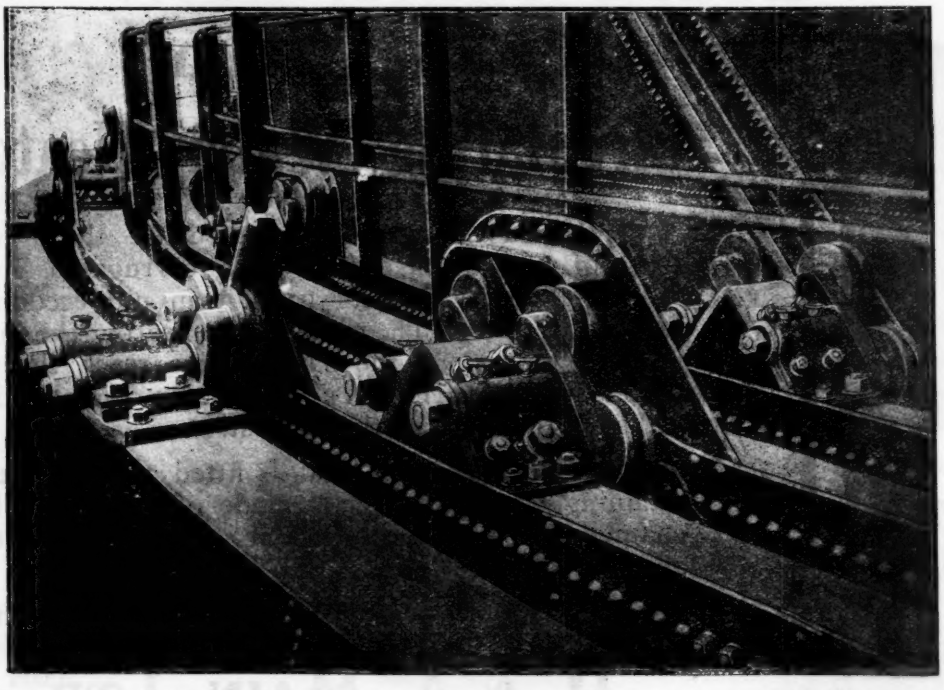
Conditions are practically unchanged. Supplies continue to improve, and prices are slightly easier. Benzol and toluol are firm at 28 c. in car loads. Aniline oil quotes 35 c., and salts 48 c. per lb. While no change is noted in naphthalenes, there is decided firmness due to lack of material. Some of the leading houses in this line have withdrawn from the market for the time being, as they are sold ahead into the autumn. The price ruling for flake is 8 c. to 9 c. per lb., and 10 c. for balls. Solvent naphtha is strong at 32 c. per gallon. Salicylic acid, technical, is lower at 52 c.

Irish Strike and Lighting Services.—It was feared that the general strike which took place in Ireland (outside the North-East area) last week, in protest against the treatment of certain prisoners in Dublin, would have led to the suspension of the gas and other lighting services; but, fortunately, except in a few instances, better counsels prevailed, and a minimum of inconvenience resulted. Many gas staffs and workers were, however, off duty, so strong was the pressure of organized Labour. It was at first announced in Dublin that all the public lighting services would be cut off; but in the critical circumstances that arose, with excitement running very high and an ever-present danger of riot and looting, the civic authorities deemed it best to maintain the lighting until the military curfew hour of 11.30, when, under the Corporation order, all lights were extinguished. The general strike lasted two days; and the loss in gas consumption in factories and shops must have been substantial.

Edinburgh and Leith Gas Superannuation Fund.

The second quinquennial report to May, 1919, on their superannuation fund (prepared by Mr. D. E. Wallace, C.A., F.F.A., of Edinburgh) has recently been submitted to the Edinburgh and Leith Gas Commissioners. The present contributions are 5 p.ct. on salaries and wages (2½ p.ct. paid by the employees and 2½ p.ct. out of the Commissioners' revenue), together with a special annual contribution from the Commissioners of £2035, being 3 p.ct. on the deficiency of £67,830 revealed by the actuarial report at the inception of the fund in 1909. Mr. Wallace's valuation balance-sheet shows a further deficiency of £69,179, which is mainly due to the inadequacy of the rate of contribution to provide fully for the benefits conferred, and the increase in the scale of salaries and wages, which involves larger pensions on retirement than those originally anticipated, while the contributions therefore have, in most cases, been levied for the greater part of the period on the lower scale. He pointed out that the rate of contribution required to cover the benefits is 7½ p.ct.; and he recommended that future contributions, for both existing members and new entrants, should be levied at this rate—one-half payable by the Commissioners, and one-half by the members. The Finance and Law Committee of the Commissioners recommended that the Actuary's suggestion should be adopted; but before obtaining the Commissioners' approval, it was decided to hold a conference with the Employees' Committee and representatives of the National Union of Corporation Workers. Among other things, it was suggested, on behalf of the employees, that contributions to the fund should be on a graduated scale according to age—the lowest being 2½ p.ct., and the highest 3½ p.ct.—and that "application should be made to the Government to liquidate any deficit that might be brought out in future actuarial reports every three or five years from Whitsunday last." At a meeting of the Commissioners held last Friday, it was decided to increase as from the 16th prox. the combined contribution on salaries and wages to 7½ p.ct.

Dudley Gas-Works Purchase Again Turned-down.—At a meeting of the Dudley Town Council last Tuesday, a Special Committee reported that they had given further consideration to the suggestion of the Trades Council that the Dudley Gas-Works be purchased by the Corporation, and were of the opinion that the time for purchase was not opportune. Mr. Taylor said the question was discussed by the Council thirty years ago; but if the proposal was not practicable, he thought the particulars should be given to the public. Mr. Ballard said that, while he favoured the acquisition of the gas undertaking, he did not forget the miserable mess the Council made in regard to the electricity works. They were suffering from the short-sightedness of men who were members of the Council in days gone by, because they could then have purchased the concern to better advantage. Mr. Lloyd intimated that years ago the purchase of the undertaking would have involved £100,000; but to-day it would cost at least doub'e. It was decided to refer the minute back to the Committee.



THE NEW "BEARSCOT" TWIN GUIDE ROLLERS

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MANCHESTER.

Civil Service Award No. 101 Adopted in Edinburgh.—The Edinburgh and Leith Gas Commissioners have decided to apply (with a few exceptions), as from Feb. 16 last, the Civil Service Award No. 101 to the members of their clerical, administrative, and technical staffs whose salaries do not exceed £400 per annum. The award to men of 21 years of age and over is £60 a year, *plus* the equivalent of 30 p.ct. of their ordinary remuneration. The annual cost of the increase is £2098.

Hamilton Borrowing Powers.—A Provisional Order inquiry was held in the Sheriff Court Buildings, Hamilton, on the application of the Corporation to obtain sanction in connection with the gas and water undertakings of the town. For gas, what was wanted was increased borrowing power to enable the Town Council to attend to gas supply; and also authority to increase certain charges relative to prepayment gas-meters. Increased borrowing powers are necessary for payment of excess borrowing; for the construction of vertical retorts and a gas-holder; the provision of gas-meters, cooking stoves, &c.; and for the projected provision of gas to Ferniegair and Quarter. The gas clauses of the Provisional Order were not opposed.

Increased Output at Stafford.—At a meeting of the Stafford Town Council held last week, Alderman Westhead, in moving the adoption of the Gas and Electricity Committee's report, stated that there had been a phenomenal increase of 23·5 p.ct., in the output of gas for the four weeks ended March 20, compared with the corresponding period of last year. The new plant was now in working order; but the holder was not yet available for use. If the consumption of gas continued to increase, the time was not far distant when they would need considerably more money to enable them to maintain the output.

Gas-Workers' Wages at Dundalk.—The stokers at the Dundalk Gas-Works recently made application for an increase in pay of £1 per week, and 17s. per week for all other labour, with the usual holidays as before. This would have meant an increase in wages of £1196 a year, and would have wiped out the dividends altogether, without the reduction of 4d. per 1000 c.ft. in the price of gas which the Company have been called upon to make. However, Mr. George Airth (the Engineer and Manager) opened-up negotiations with the Union delegates, with the result that the men reduced their demands by 10s. in each case.

STOCK MARKET REPORT.

THE week just concluded on the Stock Exchange opened in very fair tone, and things ran smoothly enough for the first three days; the gilt-edged market setting a good example with a strengthening of Government issues. But on Wednesday came the startling surprise of an advance in the Treasury Bill rate to 6½ p.ct.; and this, ushering a rise in the Bank rate which followed next day, brought about a general shake-up of prices in the principal markets. Friday's prices for the leading Home Government securities were: Consols 45⅞-46¼, War Loan 86 11/16-87 7/32, Funding 68⅛-69⅛, Victory 75⅝-76¼. War Bonds were easier.

Home Rails were very quiet and dull; prior charges were marked down. Canadians were weak, especially Grand Trunks, and Argentines were down in spite of good traffics.

In the Foreign Market, French Loans oscillated in strange fashion—sometimes falling with the exchange, sometimes rising in spite of it. Of the rest, Belgian, Brazilian, and Chinese were the steadiest.

The Miscellaneous Market in general, and Industrials in particular, showed depression by dearer money. Rubber was quite dull, and Oil jumped about spasmodically.

Business in the Gas Market was very limited, no one apparently caring much either to buy or to sell. As in other markets, so here, wherever any business was done it was at lower figures; and secured issues suffered with the rest. In the London Companies, the quotations of all three were from 1 to 2 points easier. In Suburban and Provincial, Brentford, South Suburban, Tottenham, and Southampton had reductions in some issues. Imperial Continental was very flat, receding 8 points, and Primitiva was lower.

Bargains done for cash during the week were as follows: On Monday, Buenos Aires debenture 48, Commercial 4 p.ct. 54½, European 7, Gas Light ordinary 52, 52⅛, 53, 53¼, 53⅛, ditto preference 57½, 57⅝, Imperial Continental 120, Monte Video 74, Primitiva 25s., 25s. 6d., ditto preference 47s. 6d., 47s. 9d., ditto debenture (1911) 48½, South Metropolitan 53⅝, 54⅛, ditto debenture 47, Southampton 60, Southend 5 p.ct. "B" 49, 49½. On Tuesday, Brentford preference 70, Commercial debenture 46, Gas Light ordinary 52, 52⅛, 52⅝, 53¼, ditto debenture 48, Imperial Continental 118, 120, Monte Video 74½, Primitiva preference 48s., South Metropolitan 54. On Wednesday, Commercial 4 p.ct. 54, ditto debenture 46, European 7, 7 1/16, 7⅛, 7⅜, Gas Light ordinary 52, ditto maximum 39, ditto preference 57, Imperial Continental 118, 119, South Metropolitan 53⅛, 54, 54⅜, South Suburban 64, Tottenham debenture 61, 61¼. On Thursday, Alliance and Dublin 38, 38½, Commercial 4 p.ct. 54½, Gas Light ordinary 52⅛, 53, ditto preference 56, 56¼, ditto debenture 49¾, Imperial Continental 120, South Metropolitan 53¼, 54. On Friday, Buenos Aires debenture 47, 47⅛, Commercial 3½ p.ct. 49½, European 7⅛, Gas Light ordinary 51⅞, 52, 52⅛, 52⅜, 53, Imperial Continental 118, South Metropolitan 53, ditto debenture 47.

In the Money Market, the feature of the week was, of course, the long-discussed advance of the Bank rate, which on Thursday was raised from 6 to 7 p.ct. Loan and discount rates have risen proportionately; but supplies were adequate to meet requirements.

The Public Utility Companies (Capital Issues) Bill was read the third time, and passed.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares	When ex-Dividend.	Ante-War Dividend & Bonus. p.c.	Last Dividend.	NAME	Closing Prices, July 28, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref.	..	58–63	..
1,551,868	"	Mar. 26	3½	3 2/3%	Alliance & Dublin Ord.	39–54	37–42	38–38½
374,000	"	Jan. 15	4	4%	Do. 4 p.c. Deb.	76–79	61–63	..
280,000	5	Oct. 30	7½	8%	Bombay, Ltd.	5½–6½	5–5½	..
50,000	10	Feb. 26	15	10%	Bournemouth Gas and Water { 10 p.c.	20–30	8½–9	..
388,110	10	"	7	7%	B 7 p.c.	15–15½	9–10	..
115,800	10	"	6	6%	Pref. 6 p.c.	13½–14	8½–9	..
102,055	—	Dec. 30	—	4%	4 p.c. Deb.	..	64–66	..
993,845	Stk.	Feb. 12	14	30/-	Brentford A Consolid.	361–366	45–50	..
134,938	"	"	11	26/8	Do. B New	204–209	40–45	..
55,800	"	"	5	5%	Do. 5 p.c. Pref.	109–111	70–75	70
221,400	"	Dec. 11	4	4%	Do. 4 p.c. Deb.	91–98	64–66	..
214,775	"	Mar. 11	11	7½%	Brighton & Hove Orig.	205–218	121–126	..
244,900	"	"	8	6⅔%	Do. A Ord. Stk.	154–159	80–85	..
1,387,500	Stk.	Feb. 26	5	5%	Bristol 5 p.c. max.	..	..	..
680,000	20	Apl. 14	12½	10%	British	44–45	24–25*	..
120,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	88–90	59–61	..
345,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	55–57	47–50	47–48
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½–2½	7½–7⅞	..
180,000	10	Oct. 30	—	4½%	Do. 4½ p.c. Pref.	5–6	6⅛–6⅝	..
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70–75	58–63	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108–110	..	..
1,518,250	"	Feb. 26	5/9/4	33/4	Commercial 4 p.c. Stk.	106–108	54–59	54–54½
600,000	"	"	5½	26/8	Do. 5½ p.c. do.	108–108	48–53	49½
475,000	"	Dec. 11	5	5%	Do. 5 p.c. Deb. Stk.	69½–71½	46–49	46
500,000	"	"	4	—	Continental Union Ltd.	76–79	27–32	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115–118	40–60	..
51,600	Stk.	Feb. 26	14½	10 4/5%	Croydon A 10 p.c.	..	130–140	..
278,400	—	"	11½	7 4/5%	Croydon B and C 7 p.c.	..	90–100	..
492,270	Stk.	—	5	5%	Derby Con. Stk.	135–138	..	..
55,000	"	—	4	4%	Do. Deb. Stk.	102–104	..	..
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½–18	7–9	7–7½
16,398,975	Stk.	Feb. 12	4/11/4	30/-	Gas Light and Coke { 4 p.c. Ord.	98–102	50–53	51½–53½
1,600,000	"	"	3½	26/8	3½ p.c. max.	76–79	38–43	39
4,962,925	"	"	4	4%	4 p.c. Con. Pref.	95–99	55–58	56–57⅞
4,874,850	"	Dec. 11	8	8%	3 p.c. Con. Deb.	79½–74½	47–49	48–49½
150,000	"	"	10	10%	10 p.c. Bonds	..	..	..
89,500	"	Mar. 11	5	33⅓%	Hastings & St. L. 5 p.c.	..	55–60	..
265,740	"	"	5½	28⅔%	Do. 5½ p.c	37–39	33–43	..
70,000	10	April 29	11	7½%	Hongkong & China, Ltd.	16½–16¾	8½–9½	..
66,600	Stk.	Mar. 11	9	6⅔%	Hornsey 7 p.c.	..	88–93	..
121,000	"	"	7½	5 5/7%	Ilford A and C.	151–154	86–91	..
55,750	"	"	6⅔	4 4/7%	Do. B	115–118	65–70	..
65,500	"	Dec. 30	4	4%	Do. 4 p.c. Deb.	92–94	59–63	..
4,940,000	"	May 14	9	4½%	Imperial Continental	156–160	115–120	118–120
1,925,000	"	Feb. 12	8½	5 4/7%	Do. 5½ p.c. Deb. Red.	84–86	80–85	..
255,243	"	Mar. 26	6½	5 1/7%	Lea Bridge Ord. 5 p.c.	119–121	80–85	..
2,498,995	"	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A	211–213	..	..
					{ B	146–148		
306,088	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,786	"	Feb. 26	7/5/6	33⅓%	Maidstone 5 p.c.	..	52–57	..
76,000	5	June 11	5	5%	Malta & Mediterranean	4½–4¾	1½–2½	..
250,000	100	Apl. 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99–101	89–96	..
541,920	Stk.	Nov. 27	4	5%	Monte Video, Ltd.	11½–12	72–77	74–74½
1,615,893	"	Feb. 26	4½	3 1/3%	Newcastle & Gateah'd Con.	99½–99½	63–65	..
939,795	"	Dec. 30	5½	3 1/3%	Do. 5½ p.c. Deb.	84–88	55–57	..
15,000	10	Mar. 11	—	8⅓%	North Middlesex 10 p.c.	..	12–12½	..
55,940	10	"	7/14/0	6 4/7%	Do. 7 p.c.	14–15	8½–9½	..
800,000	Stk.	Nov. 27	5	5%	Oriental, Ltd.	117–122	103–106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½–7⅝	4⅜–5½	..
60,000	50	Mar. 11	12	7½%	Portsea Island B	128–131	66–71	..
100,000	50	"	12	6⅔%	Do. C	118–121	63–68	..
949,986	5	April 29	5	—	Primitiva Ord.	5½–6	1½–1⅞	55/–25/6
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4½–5	2½–2⅞	47/6–48/-
831,800	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91–93	70–74	..
600,000	Stk.	Jan. 29	4	4%	Do. " " 1911	..	48–51	48½
848,198	"	Dec. 30	4	4%	River Plate 4 p.c. Deb.	95–97	47–50	..
150,000	10	Mar. 26	6	6/-	San Paulo { 6 p.c. Pref.	10½–11	7½–7⅞	..
195,000	50	Dec. 30	5	5%	{ 5 p.c. Deb.	4½–49	39–41	..
135,000	Stk.	Mar. 11	10	50/-	Sheffield A	223–224	68–73	..
209,954	"	"	10	4 1/2%	Do. B	223–224	58–63	..
228,500	"	"	10	35/5	Do. C	220–222	58–63	..
152,201	Stk.	Sept. 13	4	4%	Shrewsbury 5 p.c.	..	..	..
98,220	10	Oct. 15	9	10%	South African	10½–11½	12–13	..
6,609,895	Stk.	Feb. 12	5/4/0	30/-	South Met. 4 p.c. Ord.	111–113	51–54	53–54⅞
250,000	"	Jan. 15	—	5%	Do. Pref.	..	93–95	..
1,296,445	"	"	8	8%	Do. 5 p.c. Deb.	72½–74½	47–50	47
224,220	"	Feb. 26	3½	3 1/2%	South Shields Con. Stk.	157–159	103–104	..
1,087,795	"	Aug. 14	6	5 5/7%	S'th Suburb'n Ord. 5 p.c.	114–118	64–69	64
247,558	Stk.	Dec. 30	6	5%	Do. 5 p.c. Deb. Stk.	116–118	78–83	..
647,740	"	Nov. 13	7½	5 5/7%	Southampton Ord.	99–102	60–63	60
121,275	"	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	..	61–63	..
130,000	"	Aug. 14		33⅓%	Tottenham { A 5 p.c.	185–188	68–73	..
722,275	"	"	6	2 6/7%	B 5½ p.c.	115–117	48–53	..
151,255	"	Dec. 11	4	4%	District { 4 p.c. Deb.	87–89	61–64	61–61½
122,220	10	Dec. 30	5	—	Tuscan, Ltd.	5–6	1–2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93–95	45–50	..
236,475	Stk.	Mar. 11	5	3 1/3%	Tynemouth 5 p.c. max.	106½–109	72–74	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	"	Feb. 26	8½	55/-	Wandsworth A 5 p.c.	151–156	83–88	..
255,626	"	"	6½	40/-	Do. B 5½ p.c.	129–134	61–66	..
198,075	"	"	—	38/6	Do. C	..	61–66	..
140,865	"	"	—	38/6	New Ordinary	..	61–66	..
363,000	"	"	6 ⅔	35/9	Wimbledon 6 p.c.	117–123	63–68	..
98,000	"	"	6⅔	40/-	Epsom 5 p.c.	121–126	63–68	..
88,416	"	Dec. 30	8	8 4/7%	5 p.c. Deb. Stk.	86–89	48–50	..

* Ex Div.

Gas and the Profiteering Act.

One of the cases which came before the Bradford Profiteering Committee at a meeting on Monday of last week was in connection with the gas undertaking. Mr. Timothy M'Cormick summoned the Gas Committee with overcharging him 4s. in respect of gas. He stated that in June last he turned off his gas at the meter; and when the inspector came he marked the gas-card "Standing." Nevertheless, he was charged for 400 c.ft. for one quarter, and for 600 c.ft. in the other quarter of the half year ended December. He maintained that during this period he had not consumed any gas at all. In reply to the Chairman (Mr. F. Pickering), he stated that in July his attention was drawn to Condition 7, printed on the back of the bills, which read: "Minimum Charge—A minimum charge for 1000 c.ft. will be made in all cases where supply has been given, or where a meter has been connected during the preceding six months, even should the actual consumption be less than 1000 c.ft." Mr. Leatham said the Corporation had power under the Gas-Works Clauses Act to impose the condition. If the gas had been cut off by the Corporation, there would probably have been no charge made; but the consumer had turned it off himself. The charge of 4s. was made because the supply of gas was available. The charge not being for the sale of gas, there could not be any profiteering. After evidence for the defence had been called, the Committee decided that the case had not been proved, and must be dismissed.

Substantial Price Reduction in Edinburgh.—The Edinburgh and Leith Gas Commissioners, acting on figures supplied by their Engineer (Mr. Alexander Masterton) and Burgh Treasurer (Mr. A. Canning Williams), have decided to reduce the price of gas by 8d. per 1000 c.ft. for six months, as from the April-May readings of the meters; making the rate 5s. per 1000 c.ft., subject to the rebate under the Coal (Pit's Mouth) Prices Order, 1919, which is at present 10d. The net price to ordinary consumers within the city boundaries will therefore be 4s. 2d., as compared with 2s. 8d. in 1914. This substantial reduction has been rendered possible by "the unforeseen increase in the consumption of gas, the better returns from residuals, and the economies which have been effected in the working."

The Cowdenbeath Town Council have decided to delay the consideration of the purchase of the gas-works for three months.

Messrs. J. Brown & Co., Ltd., manufacturing chemists, of Dewsbury, have taken over as a going concern the business of Messrs. Fletcher, Bros. & Co., of Wellowgate, Grimsby.

The Gas Committee of the Nelson Town Council have appointed Mr. J. T. Simpson, of Liberton, Midlothian, as Technical Assistant at the gas-works at a commencing salary of £250 per annum, inclusive of war bonus.

The Gas Committee of the Arbroath Town Council have sent a deputation to study the working of automatic street gas lighting at Dundee. From a report, the Committee hold that the cost of introducing a similar system into Arbroath would amount to £2930.

Four beds of retorts and regenerators are to be renewed at the Stockton-on-Tees Gas-Works, at an estimated cost of £3500. The Manager (Mr. W. W. Atley) has been unable to recommend the Committee to entertain the proposal to instal a battery of coke-ovens at the works.

Since the commencement of the Eastbourne Gas-Works Employees' Savings Association, on April 7, 1917, to the end of March, 1920, £1905 has been subscribed, and 2459 certificates bought. With an average membership of 66, this works out at the satisfactory figure of about £28 per member.

The French Syndicale Chamber for Hardware have associated themselves with a resolution adopted by the Chamber of Commerce of Paris, asking the Government at once to introduce legislation prohibiting strikes in all public services—such as transport, water, gas, electricity, and mines.

An extraordinary general meeting of the Shirebrook Gas Company was held last Wednesday, when it was unanimously agreed to issue 1000 ordinary £10 shares at par—such new shares to be offered in the first instance to the existing proprietors in the proportion of one new share for each three existing shares.

A gas explosion, which resulted in much damage to property and severe injuries to a girl named Rose Guest, occurred last Wednesday at the nail and chain factory of Messrs. Eversley and Co., Old Hill. The roof of the japanning shop was blown off. The explosion was, curiously, due to gas accumulation in a room other than that in which the leakage occurred.

The post of Outdoor Manager to the Aldershot Gas, Water, and District Lighting Company, lately vacated by Mr. A. Bell, has been filled by the promotion of Mr. P. Oldroyd, previously District Inspector "A" Area (Gas and Water). The various gaps thus occasioned in subordinate positions have all been filled by promotion of the Company's own servants.

The military barracks at Dundalk, in accordance with present Government procedure, are installing electric light, which is to cost 8d. per unit, as against a charge of 5s. 8d. per 1000 c.ft. for gas. If during the recent disturbances electricity had been in use, at midnight (when the electricity men, in response to the orders, ceased work) the whole place would have been thrown into darkness. Fortunately, however, the Gas Company, in some way or other, managed to keep up a supply of gas.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for April 14.]

Nos. 9535—10,111.

ABRAHAMS, E. GOLDSMID.—"Steam-generators for producer-gas plants." No. 9891.

BATES, A.—"Manufacture of anti-vibrators for gas-fittings." No. 9614.

BOHAR, V.—"Gas-stoves and burners therefor, and hot-water supply from gas-stoves." No. 9556.

COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATÉRIAL D'USINES À GAZ, EAU, ET ELECTRICITÉ.—"Gas-meters." No. 9999.

COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATÉRIAL D'USINES À GAZ, EAU, ET ELECTRICITÉ. — "Constant-level gas-meters." No. 10,000.

ELLIOTT, J.—"Pressure regulating or reducing valves." No. 10,064.

FREDMAN, M.—"Galleries or holders for incandescent gas-shades, &c. No. 9926.

MARTIN, R. J.—"Gas-tight connections." No. 10,029.

NORTH, W. C.—"Gas-heated radiators." No. 9781.

O'REILLY, F. J.—"Gas fire-lighters." No. 9908.

PARKER, J. W.—See Abrahams. No. 9891.

REDPATH, A.—"Acetylene gas generator." No. 9560.

SLOMAN, J.—"Economizers for inverted gas-mantles." No. 9741.

SOC. E. PERCEVANT ET CIE.—"Gas-stoves." No. 9879.

WOOD, W.—"Device for economizing fuel and giving better radiation of heat." No. 9580.

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